# A REVIEW OF SURREY RCMP DETACHMENT MOTOR VEHICLE COLLISIONS


*Garth Davies, Irwin M. Cohen, and Amanda V. McCormick*

UNIVERSITY OF THE FRASER VALLEY

CENTRE FOR PUBLIC SAFETY & CRIMINAL JUSTICE RESEARCH

## Introduction

It is now widely understood that police motor vehicle pursuits exponentially increase the potential for injury and death for the police, the suspect, and the general public (Becknell, Mays, & Giever, 1999; Best, 2002; Crundall, Shenton, & Underwood, 2004; Docking, Bucke, Grace, & Dady, 2007; Hoffmann & Mazerolle, 2005; Johnson & Dolan, 2014; Payne & Fenske, 1996). As such, many police organizations have either introduced strict pursuit policies or prohibited them altogether (Johnson & Dolan, 2014). Yet, while accidental on-shift deaths have decreased for the general population of workers, and traffic fatalities among citizens have generally been declining, these rates have remained stable for police officers, which suggests that not enough is being done to reduce the risk of police officer accidental death (Floyd & Morison, 2010; National Law Enforcement Officers Memorial Fund, 2010; Noh, 2011; Southwick, 2010). General duty police officers spend a substantial proportion of their shift in their vehicle, which has essentially become an office on the road, offering multiple sources of distraction (Connelly, 2012; Miller, 2006; Plecas, McCormick, & Cohen, 2011). Notably, police officer accidental deaths are most commonly attributed to motor vehicle collisions (National Law Enforcement Officers Memorial Fund, 2010). In fact, driving a motor vehicle while on shift is one of the higher risk activities that a police officer engages in. This report provides an analysis of police involved motor vehicle collisions occurring in Surrey, British Columbia, and, to contextualize the results and provide some suggestions for reducing motor vehicle collisions among police, a review of the recent literature on the frequency, causes, and strategies to reduce police motor vehicle collisions is provided.

## Literature Review

### FREQUENCY AND CAUSES OF POLICE MOTOR VEHICLE COLLISIONS

Rather than weapons or violence, the most common threats to police officer safety are actually posed by their vehicle (Kanable, 2009; Pinizzotto, Davis, & Miller, 2002). Statistics reported by the United States National Law Enforcement Officers Memorial Fund indicated that, for more than a decade, more police officers have died each year as a result of a traffic related injury than any other source, including gunfire (Batiste, Wagers, & Ashton, 2011; Brandl, 1996; National Law Enforcement Officers Memorial Fund, 2010). One reason for this may simply be that general duty police officers spend so much of their time in or around their vehicles (Plecas et al. 2011).

Using data collected by the Fatality Analysis Reporting System held by the National Highway Traffic Safety Administration, Noh (2011) analysed the characteristics of law enforcement officers killed in motor vehicle collisions between 1980 and 2008 in the United States. He found that between 2000 and 2008, on average, 36 law enforcement officers were killed each year, representing an increase from the average of 25 officers killed each year between 1980 and 1999. Several studies have now concluded that officers in their mid-30s, with approximately 10 years of policing experience, are most at risk of dying in a motor vehicle collision while on-duty, possibly as a result of a sense of invincibility accumulated by having many years on the job successfully experiencing high-risk situations (Docking et al., 2007; Noh, 2011; Pinizzotto, Davis, & Miller, 2002). Similarly, Canadian research has generally found that RCMP members involved in police motor vehicle collisions are in their early 30s with an average of nearly 10 years of experience (Cohen et al., 2009; Cohen & Plecas, 2007; Plecas, McCormick, Lee, Cohen, & Armstrong, 2011).

The Centre for Public Safety and Criminal Justice Research at the University of the Fraser Valley has previously completed three studies on RCMP motor vehicle collisions. In 2009, the Centre used Police Motor Vehicle Accident Reports to review the sources and costs of collisions occurring among the Burnaby RCMP between January 1 2006 and October 1 2008 (Cohen, Plecas, Mahaffy, & Levine, 2009). A total of 115 accidents were reported during this period; 30 in 2006, 57 in 2007, and 28 during the first nine months of 2008. Although the members in this detachment who were involved in motor vehicle collisions were less experienced police officers than typically found in other studies, with an average of nearly four years of experience, the other findings were generally consistent with the national studies conducted to date.

The Centre for Public Safety and Criminal Justice Research conducted two national studies on RCMP motor vehicle collisions (Cohen & Plecas, 2007; Plecas et al., 2011). In 2011, the Centre analysed 7,000 police motor vehicle collision reports between 1998 and 2010 held in the National Claims and Litigation Directorate database. Considering only those collisions occurring between 2008 and 2010,[1] although RCMP E-Division was the largest district in terms of membership, they were behind the Saskatchewan, Alberta, Manitoba, and New Brunswick divisions in terms of frequency of collisions. Nationally, RCMP motor vehicle collisions resulted in very few injuries to members (2%) and no fatalities. Of the 7,000 collisions held in the aforementioned database, 23% were the result of a member driving error. In nearly one-third of the member at-fault collisions, the RCMP member sideswiped another vehicle or object, while in another one-fifth they rear-ended another vehicle or object. Of note, at the time of the collision, the RCMP member was travelling, on average, only 24 kilometers per hour (Plecas et al., 2011). Slightly more than one in ten collisions were the result of either hitting an animal (13%) or backing up (13%). These results were consistent with the earlier study of national police motor vehicle collisions and the Burnaby RCMP study. Overall, around one-quarter of RCMP motor vehicle collisions occurred during routine patrol, nearly one-fifth occurred while backing up, and less than one in ten occurred while operating the vehicle in an emergency mode, such as with the vehicle's lights and sirens engaged. All three studies indicated that police were generally travelling at or below the speed limit at the time of the collision.

Although it may be expected that emergency driving would increase the risk of motor vehicle collisions, several studies, including those previously conducted by the Centre for Public Safety and Criminal Justice Research, have found that most police motor vehicle collisions actually occurred when officers were driving in non-emergency mode (Cohen et al., 2009; Cohen & Plecas, 2007; Citrowske et al., 2011; Noh, 2011; Plecas et al., 2011; Powers & Stutzman, 2012a; von Kuenssberg Jehle, Wagner, Mayrose, & Hashmi, 2005).[2] This suggests that factors other than speeding were

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[1] Over the last 15 years, there has been an increasing tendency to include records in the database. As a result, this study focused on collisions between 2008 and 2010 when the data was considered to present the most accurate reflection of police MVCs.

[2] Similarly, in the study by Docking et al. (2007) on traffic collisions resulting in fatalities or serious injuries in England and Wales, once pursuit-related collisions (n=192) were removed, the remaining collisions primarily occurred during non-emergency driving (n=50) as opposed to emergency response driving (n = 33).

potentially to blame. Recent research tends to identify driver distraction and driver fatigue as primary factors contributing, at least in part, to motor vehicle collisions involving the police.

## DRIVER DISTRACTION

Distracted driving is understood as paying attention to anything other than driving while operating a motor vehicle (Ashton, 2010). The United States Department of Transportation identified three forms of driver distraction: visual, when the driver takes their eyes off the road; manual, when the driver takes their hands off the wheel; and cognitive, when the driver is mentally focused on something other than driving (United States Department of Transportation, 2010 as cited in Citrowske et al., 2011). Sources of distraction come from both outside of the vehicle (e.g., pedestrians, other vehicles, and scenery) and inside (e.g. mobile phones, radios, navigation systems) (CAA, no date).

Today, police have access to a wide range of technologies in their vehicle, including their two-way radio, work mobile phone, personal mobile phone, mobile data terminal, radar equipment, and lights and siren controls (Connelly, 2012; Donahue & Demand, 2011; Kanable, 2009; Plecas et al., 2011; Richtel, 2010). Several studies with the RCMP have documented that police often multi-task while driving their vehicle, for instance, by using their mobile data terminal or mobile phone while also scanning the environment for suspicious activities (Anderson, Courtney, Plecas, & Chamberlin, 2005; Cohen et al., 2009; Plecas et al., 2011). Unfortunately, these increased sources of distraction appear to be a common cause for motor vehicle collisions in which the police are at fault (Batiste et al., 2011; Donahue & Demand, 2011; Friedman, 2013; Powers & Stutzman, 2012b; Rubin, 2012).

Citrowske and colleagues (2011) reviewed 378 police-involved traffic collisions that occurred in Minnesota between 2006 and 2010. Slightly more than one-tenth (14%) of collisions involved distracted driving as a primary cause. Collisions resulting from distracted driving appeared to result in much more serious incidents, since traffic collisions resulting from distracted driving cost, on average, twice as much ($6,000 USD) than traffic collisions from other causes ($3,000 USD). In terms of the source of distraction, half of all distracted driving collisions were associated with the use of mobile data terminals (MDT). When the MDT was the source of the distracted driving collision, the average claim amount rose to $10,000 USD (Citrowske et al., 2011). Elsewhere, in a review of state-reported emergency vehicle collisions in Texas, an average of three collisions per month were at least somewhat attributed to a source of distraction inside the vehicle (Friedman, 2013).

Strayer, Drews, and Crouch (2006) demonstrated that the effect of driving while using a cell phone was equivalent to driving with a blood alcohol level of .08. Given the potential dangers posed by distracted driving, some police agencies have introduced policies restricting the use of technology while simultaneously operating the police vehicle (Ashton, 2010). For instance, a Sheriff's Office in Dallas prohibits drivers from using the MDT while operating the vehicle, with the exception of pressing one-button responses used to quickly indicate that an officer is enroute to, arrived at, or clearing a scene (Friedman, 2013). The Florida Highway Patrol adopted hands-free voice communication systems for use while operating a motor vehicle and introduced a policy to prevent officers from dialing calls and sending/receiving information while driving, requiring that “[m]embers must be able to maintain both hands on the steering wheel while the vehicle is in motion...” (Florida Highway Patrol, 2010: Policy 7.10.06(d)). The Illinois State Police and Las Vegas Metropolitan Police Department have likewise introduced hands-free cell phone use, but have restricted their use during emergency (Code 2 or Code 3) driving (Ashton, 2010).

However, many police agencies lack such policies, despite the well-known risk of distraction posed by tools, such as cell phones (Batiste et al., 2011). While British Columbia has introduced provincial legislation under the *Motor Vehicle Act* preventing drivers from using hand-held devices while driving, police officers are given an exemption from this law when the electronic device is being used in the context of carrying out their powers, duties, or functions as police. Likewise, although a majority of American states have policies preventing citizens from using handheld devices while operating a motor vehicle, law enforcement officers are exempt from most of these restrictions (Ashton, 2010; Donahue & Demand, 2011; Ellison, 2010). Interestingly, although originally exempted from the state legislation, the Washington State Patrol issued an agency directive that state laws preventing citizens from texting and using a handheld cell phone while driving also applied to its officers (Ashton, 2010).

## DRIVER FATIGUE

Fatigue reduces levels of awareness, reaction times, and decision-making abilities (Rosekind & Gander, 1996). In relation to motor vehicle collisions, numerous studies have now concluded that driving while fatigued is akin to driving while impaired. After 17 hours of sustained wakefulness, motor skills are equivalent to and sometimes worse than a person with a blood alcohol content of 0.05%, while after 20 to 24 hours, motor skills are equivalent to a blood alcohol content of 0.10%, which exceeds the maximum legal impairment level of 0.08% while driving in Canada (Dawson & Reid, 1997; Lamond & Dawson, 1999; Williamson & Feyer, 2000). While presumably the vast majority of police officers would never consider working while impaired by alcohol, Vila and colleagues (2006; Vila et al., 2002) used pupil reaction tests to demonstrate that officers were highly impaired (roughly equal to a BAC of 0.10%) from fatigue for 6.2% of the 5,274 work days they studied; the equivalent of nearly one full year of shifts (327 days). For 19% of these shifts, officers were impaired by fatigue at levels roughly equal to a 0.05% BAC (Vila, 2006; Vila et al., 2002).

The recommended amount of sleep for optional cognitive and physical functioning is between seven and eight hours (e.g. Rosekind & Gander, 1996). Two studies conducted in Japan identified a sleep duration of less than six hours as a consistent risk factor for motor vehicle collisions, particularly those involving rear-end collisions and single vehicle collisions (Abe, Komada, Asaoka, Ozaki, & Inoue, 2011; Abe, Komada, Nishida, Hayashida, & Inoue, 2010). In the first study, they identified that self-reported sleep duration of less than 6 hours increased the risk of a motor vehicle collision eight-fold, while more than 6 hours, but less than 7 increased the risk nearly 6.5 times (Abe et al., 2011).

These findings are particularly significant since research with North American police officers has found that 53% of officers slept less than 6.5 hours per night and 17% slept eight or more hours a night (Vila, 2006; Vila, Morrison, and Kenney, 2002).[3]In addition, nearly all officers (91%) reported regularly feeling fatigued, the vast majority (85%) had driven while drowsy, and 39% had fallen asleep while driving (COPS, 2011).[4] Similarly, in Senjo's (2011) interviews with police officers from 15 different agencies across the United States, 70% of officers reported that they felt they needed between seven and nine hours of sleep per night, yet two-thirds of this 70% reported having only three to six hours of sleep in a 24 hour period within the last month. Of note, these officers were only those who worked day shift; thus, the proportion of officers on night shifts reporting sleep issues is likely even higher. In fact, Vila and colleagues (2002) found that 41% of nearly 300 officers who completed a sleep quality measure (the Pittsburgh Sleep Quality Index) scored at levels high enough to indicate medical attention. Of note, their scores on this measure were two times as high as those found in general public, indicating substantially poorer quality sleep. Neylan and colleagues (2002) compared police officers working variable (n=551) and stable (n=182) day shifts to non-officers working similar shifts (n=98 and n = 232, respectively) and, using the same sleep measure, assessed officers as receiving significantly poorer quality sleep and less sleep time on average.

There are many sources of fatigue for police officers, including shift work, sustained periods of being awake, and an inability to catch up on sleep while off duty (Rosekind & Gander, 1996). Even when officers get sufficient sleep, working a lengthy shift on the road can also contribute to an increased risk of collision. Arendt, Wilde, Munt, and McLean (2001) found that extending wake time by even three hours reduced a driver's ability to maintain speed and road position in a similar fashion to the effects of alcohol impairment. These findings are particularly relevant for officers working shift work, as their return to a 12-hour shift after four days off requires an abrupt shift in duration of awake time, meaning that the risk for collision may be increased during the first shift back to work. In fact, in the 2011 national study of police motor vehicle collisions, on-duty members involved in a collision were typically (91%) on their first shift of the cycle and had slept, on average, only five hours in the previous 24 hours (Plecas et al., 2011). The nature of the data did not allow the researchers to test the causal influence of fatigue on driver error and the analysis did not account for driver fault or reflect at which point during the 12-hour shift the collision occurred. Ultimately, determining how far into the shift the member was before the collision occurred might have provided some clarity on the role of fatigue. Unfortunately, the necessary data (e.g., the time the shift started) was not regularly reported and the available data could not be analysed in this way. It is important to note that in the analysis of collisions occurring among members in the Burnaby RCMP detachment, only 4% were documented as being tired at the time of the collision; however, in that study, members also reported having accumulated eight hours of sleep in the 24 hours preceding the collision (Cohen et al., 2009).

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[3] This is compared to 31% and 38% of the general population, respectively.

[4] These statistics were taken from a presentation given by Bob Vila at the 2011 International Association of Chiefs of Police conference.

The negative effects of fatigue exert more of an influence on officers working at night, given that this shift directly conflicts with the body's natural circadian rhythms to be most alert during the daytime and less alert at night, in particular between 3am and 6am (Force Science News, 2011; Rosekind & Gander, 1996). This makes it difficult for night-shift officers to stay awake while on duty and to get restorative rest during the day while off duty (Vila et al., 2002). Not surprisingly, research on 733 police officer fatalities due to motor vehicle collisions identified that 42% of all collisions occurred between midnight and 8am, while 36% occurred between 4pm and midnight, and 23% occurred between 8am and 4pm (Noh, 2011). Statistics reported by the Albuquerque Police Department were also consistent with this research as one-third of preventable police motor vehicle collisions occurred between midnight and 6am (Cochrane, 1999 as cited in Vila et al., 2002).[5] Although not specific to injuries caused by motor vehicle collisions, Violanti and colleagues (2012) found that, in a police department using 10-hour permanent shifts, the age-adjusted incident rate for injuries was 72% higher on the midnight than day shift, and 66% higher on the midnight than afternoon shift.

## SPEEDING

Driving at unsafe speeds is an obvious risk factor for police motor vehicle collisions. In a study of California law enforcement officer traffic-related injuries and deaths, driving at unsafe speeds was a contributing factor in 83% of traffic-related law enforcement officer deaths between 1990 and 2004, and was the leading cause of 7,117 injury-involved law enforcement officer motor vehicle collisions occurring between 1997 and 2007. One-third (35%) of these latter collisions were attributed to unsafe speeds, whereas the next two most common sources accounted for only 12% (right-of-way) and 10% (improper turns) of collisions resulting in injury (California Commission on Peace Officer Standards and Training, 2009).

The Centre for Accident Research and Road Safety (2009) in Australia suggested that increasing one's speed of vehicle travel offered very little savings in time, yet increased the risk of crashing substantially. For instance, on a 10 kilometre trip, increasing one's speed from 60 kilometres per hour to 65 kilometres per hour would only save 46 seconds of time, yet would double the likelihood of a collision. This is important because speeding appears to be a common contributor to collisions among law enforcement officers in other countries. In the study of law enforcement officer deaths in California, speeding was a primary factor in 83% of fatal traffic collisions, yet only 55% of the officers were responding to a call at the time (California Commission on Peace Officer Standards and Training, 2009). In other words, a large proportion of police officers involved in motor vehicle collisions may be unnecessarily speeding at the time of the incident. Similarly, travelling at high speeds was the primary explanatory factor in nearly 2,500 Swedish police motor vehicle collisions under study by Lundälv, Philipson, and Sarre (2010). In contrast, Canadian research has not identified similar results. In the three studies of RCMP traffic collisions conducted by the Centre for Public Safety and Criminal Justice Research, speeding was a factor in only a minority of collisions

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[5] In the Albuquerque data, the early afternoon (between 1pm and 3pm) had the second highest rate of collisions and it was pointed out that many of these particular accidents involved officers from the night shifts who were on their way to court.

(Cohen & Plecas, 2007; Cohen et al., 2009; Plecas et al., 2011). In the most recent national RCMP study, only 23% of marked police vehicles were speeding (10 kilometres or more over the posted speed limit) at the time of their collision; those who were speeding were generally (45%) driving a marked police vehicle under emergency conditions (Plecas et al., 2011).

Variations in law enforcement officer driver training may explain why speed was less of a factor in RCMP traffic collisions than those occurring in California. First, RCMP training consists of 52 hours of driver training at the academy, whereas, at the time of the study, driver training in California varied between four and 80 hours. Second, the California study concluded that officers typically spent very little time driving at high speeds during training (California Commission on Peace Officer Standards and Training, 2009). Therefore, one potential avenue to reduce collisions is to increase the amount of time officers spend driving at high speed under more supervised or simulated conditions so that they are better prepared for their in-service work. This suggestion will be discussed further in the section of the report focusing on strategies to reduce collisions.

### RIGHT-OF-WAY COLLISIONS

When police are responding to a call using their emergency equipment (i.e., lights and siren), they are permitted, using cautionary procedures, to drive through a red light. Thus, it would be anticipated that the risk for a motor vehicle collision would be heightened at intersections. According to Yates (2012), police are most at risk for harm when crossing an intersection, regardless of whether they are driving in emergency mode or not. While the national study of RCMP collisions did find that most (62%) collisions occurred at an intersection, police were no more likely to experience a collision when driving with their emergency equipment activated than when driving under regular conditions. In fact, at light-controlled intersections, marked police vehicles were equally likely to experience a collision regardless of whether they had their emergency equipment activated. Interestingly, marked police vehicles were more likely to experience a collision at uncontrolled intersections when travelling without their emergency equipment activated than when they had their lights and siren on.

## Strategies to Reduce Police Motor Vehicle Collisions (PMVC)

Although speeding and pursuits have historically been the most discussed factors in relation to police motor vehicle collisions, many police agencies have introduced policies to prevent or limit officers from engaging in these activities. However, the more recently discussed sources of police motor vehicle collisions have yet to be the subject of policy and practice on a widespread scale. This section reviews some of the main strategies introduced by agencies across North America in response to factors, including driver distraction and fatigue, to reduce police involved motor vehicle crashes.

## DRIVER RECERTIFICATION OR UPGRADED TRAINING

Pinizzotto and colleagues (2002) found that police officers generally only receive motor vehicle training as cadets. Importantly, Gustafson and Cappitelli (2010) reported that many such vehicle training programs leave police officers inadequately prepared for the types of driving they actually engage in once on the road. For instance, in their review of training programs across California, the researchers found that very few programs required officers to drive continuously at high speed, practicing skills they would need to drive on highways or when engaging in pursuits. However, as many police agencies today have restrictions on conducting pursuits, this gap in training may not be so problematic.

As mentioned above, RCMP members receive 52 hours of driver training during their initial training at depot, which includes the use of simulated driver training scenarios (Commission on Peace Officer Standards and Training, 2013). Following this training, there is optional Advanced Driver Training available. In their previous national study on RCMP traffic collisions, Cohen and Plecas (2007) determined that members involved in motor vehicle collisions had received their last driver training, on average, eight years prior to their collision. Other studies have similarly identified gaps of five years or more since last participating in a driver training course (e.g. Dorn & Brown, 2003). In Dorn and Brown's (2003) qualitative study with 54 police officers, 89% felt that they would have benefited from more driver training. Of note, 29% of these officers were motor vehicle accident-free, while half were at fault for at least one crash in the past three years.

There are several reasons why police officers may be found at fault for their motor vehicle collision, including driving while distracted, driving while fatigued, or driving without consideration for environmental conditions. Noh (2011) found that 74% of police vehicle collisions in the United States involved at least one driver-related factor. Most commonly, the officer failed to keep in their proper lane or ran off the road (46%), suggesting either distraction or fatigue were to blame, while a nearly equal proportion (43%) were driving too fast for the current conditions or were speeding. Lundälv and colleagues (2010) examined police motor vehicle collisions in the largest county in Sweden and concluded that police drivers involved in collisions typically were driving inappropriately given the traffic conditions, such as by speeding through intersections or driving too fast on wet roads. They suggested police could benefit from better driving education. Similarly, Docking and colleagues' (2007) review of serious injury or fatal road traffic incidents involving police in England and Wales between April 2004 and September 2006 concluded that 54% of collisions occurring during emergency-related driving involved the officer's failure to properly assess and respond to current traffic environmental conditions, which suggests that police drivers could benefit from retraining.[6] In fact, one of the recommendations made in the Docking report was that police "forces [should] ensure that all police drivers undergo a driving assessment to identify any refresher training needs every three to five years" (2007: 58).

This is an important recommendation given that Pinizzotto and colleagues (2002) noted that police officers typically only receive driver training in the academy. Indeed, reports into police-involved collisions routinely identify a significant amount of time since the collision-involved driver had

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[6] This included speeding, failing to consider weather conditions, failing to consider the area they were driving in, or driving carelessly.

received training. For instance, Cohen and Plecas (2007) identified an average of eight years since RCMP members involved in a traffic accident had last received advanced driver training. Dorn and Brown's (2003) analysis with police officers in the United Kingdom identified an average of 5.5 years since previous driver training. While Docking and colleagues (2007) did not specify an average, they noted that, although half of traffic collision involved police officers in England and Wales had received advanced driver training, the length of time since any last driver training was between one month and 20 years, and that several officers involved in collisions were ordered to undergo a driving assessment and/or retraining.

Of note, research in California has empirically identified that advanced driver training via driving simulators every two years was effective in reducing vehicle collisions by law enforcement officers (California Commission on Peace Officer Standards and Training, 2009). This study also identified that a combination of simulated training scenarios with on-course operation of a motor vehicle was associated with the smallest proportion of collisions (43% of officers trained on both versus 52% of those without blended training). That said, if police detachments could only offer one form of training, the research suggested that simulated scenarios were better than on-course operations in that it was associated with an 8% reduction in collisions as opposed to 4%, and was more cost-effective (California Commission on Peace Officer Standards and Training, 2009).

### COUNTERACT FATIGUE

At the 2011 International Association of Chiefs of Police (IACP) meeting, Dr. Vila suggested that police officer deaths from vehicle accidents could be dramatically reduced if police chiefs and officers attended to the issue of fatigue (Force Science Institute, 2011). As previously noted, the majority of police officers start their shift fatigued and a large proportion have fallen asleep while driving. Although some of the main sources of fatigue, such as having children at home, having a long commute to work, and spending days off in court, are not necessarily fixable, others, such as shift work, could be targeted by agencies (Vila, 2006; Vila & Kenney, 2002; Vila et al., 2002). For instance, some strategies to counteract the effects of fatigue could include adjustments to shift changes or mandatory on-duty rest periods.

According to Vila, "shift work interferes with normal sleep and forces people to work at unnatural times of the day when their bodies are programmed to sleep" (2009: 54). Shifting models vary among police agencies with some operating three 8-hour shifts (e.g. 8am to 4pm, 4pm to midnight, and midnight to 8am) and others operating two 12-hour shifts (e.g. 7am to 7pm and 7pm to 7am). Both models contribute to more fatigued officers. In fact, shift-work disorder is a recognized sleep disorder that is attributed to the challenges shift work poses for proper sleep. Previous studies have found that 10% of the general population could be diagnosed with shift-work disorder, whereas 32% of night-workers could be (Di Milia, Waage, Pallesen, & Bjorvatn, 2013). Importantly, research has demonstrated that individuals meeting the criteria for shift-work disorder are at increased risk of being involved in motor vehicle accidents attributed to sleepiness (Drake, Roehrs, Richardson, Walsh, & Roth, 2004).

In his 2011 IACP speech, Vila noted that the greater amount of time an officer spends working in darkness, the more at risk they are of experiencing fatigue and decreased alertness. Thus, officers working the midnight shift or those starting their 12-hour shift at night are most at risk as a result of working while fatigued (Force Science Institute, 2011). Thus, he advocated for alternating shift start times and durations. For instance, he suggested that officers working at night start their shift earlier so that they can end earlier. Even if the officers working the day shift start earlier, each officer will spend less time working in darkness. Alternatively, he noted that shifts can vary in length, with daytime shifts conducted over 12 hours, but night shifts conducted over 8 hours so that less time is spent working in darkness. He also advised that officers be limited to a minimal number of consecutive night shifts with three being the ultimate maximum (Force Science Institute, 2011). Finally, Vila and colleagues (2002) noted that non-rotating shift models were best, as they allowed for consistent circadian rhythms to be established, but that if shift changes must be used, to use a forward (with the clock) rotating schedule over a lengthy time interval (i.e., never less than a weekly rotation). In support of this recommendation, the Philadelphia Police Shift Rescheduling Program study (as cited in Vila, 2006) found a 40% reduction in department motor vehicle accidents two years after moving away from a six-day, 8-hour shifting model that rotated counter-clockwise every eight days to a four-day 8.5-hour shifting model that rotated clockwise every three weeks.

Research has identified personal characteristics that influence how an individual responds to shift work. Flo, Pallesen, Magerøy, Moen, Grønli, Nordhus, and Bjorvatn (2012) studied the prevalence of shift-work disorder among 1,968 nurses and found that age and gender influenced the likelihood of experiencing this disorder. Specifically, males and those over 40 years of age were more likely to experience the disorder than female and younger nurses. The type of shift schedule worked was also a significant factor, with those working nights significantly more likely to experience the disorder. Notably, the risk of developing shift work disorder increased with each night shift worked in a year, and the risk was also increased for those working shifts separated by less than 11 hours. Similarly, Vila and Kenney (2002) found that age accounted for a substantial amount of officer fatigue and observed that in agencies where officers were able to participate in shift selection (e.g., based on seniority), the older officers were less likely to be assessed as fatigued. These findings led Vila and Kenney (2002) to suggest that, when possible, police agencies should allow officers, particularly older officers, to select their ideal shift schedule.

An alternative strategy to counteract fatigue while at work is to mandate short restorative periods during the shift (Force Science Institute, 2011; Gustafson & Cappitelli, 2010; Komada, Asaoka, Abe, & Inoue, 2013; Rosekind & Gander, 1996). Sustained periods of wakefulness are a major cause of fatigue (Akerstedt, 2000; Arendt et al., 2001). Thus, providing officers a dark and quiet room where they can take a 20 to 40 minute break can increase alertness levels, particularly for officers working at night (Vila, 2009).[7] Vila noted that even if officers resist having a short sleep, simply taking the time to lie down and close their eyes could have a major positive effect.

Although not directly counteracting fatigue, it is essential that supervisors understand the effects that fatigue can have on levels of alertness and the risk that poses to officer safety. Supervisors need

[7] Of note, naps should not exceed 45 minutes in order to prevent officers from entering deep sleep states that may leave them feeling groggy and disoriented, rather than refreshed and alert (Rosekind & Gander, 1996).

to be aware when members of their team are getting dangerously fatigued and intervene to minimize risk. If a rest room is available, the supervisor could order the officer to take a 30 minute break to rest and re-charge. Alternatively, they could temporarily reassign them to an activity that does not involve driving or engage the officer in an active conversation that requires them to be mentally engaged (Rosekind & Gander, 1996). Taking them for a coffee may help if the break occurs mid-shift; however, caffeine intake should be avoided in the last two to three hours prior to sleep (Rosekind & Gander, 1996). Lastly, given the increased likelihood of sleep disorders and dangerous levels of fatigue among police officers, several researchers (Komada et al., 2013; Vila, 2009) advise regularly formally screening officers for shift-work disorder or signs of fatigue.

## TECHNOLOGY TO REDUCE DISTRACTIONS AND THE IMPACT OF DISTRACTION

Although technology has increased the risk of distracted driving for police officers, it may also offer some solutions. One new form of technology is a program that shuts off or locks the mobile data terminal once the vehicle reaches a particular speed level, or that limits officers to using only one-button icons on a dashboard touch screen to indicate, for instance, that they are enroute (Commission on Peace Officer Standards and Training, 2013; Friedman, 2013). Although officers can still use their radios to communicate with dispatch or other officers, some concerns have been expressed that officers will be prevented from sending and receiving important information about the nature of the call while enroute (Friedman, 2013). An alternative or additional option is to use technology that operates on voice commands to send and receive information while operating the vehicle (Connelly, 2012; Friedman, 2013). In addition, voice-operated computer systems can be used by police officers to turn on their lights and siren using only voice commands, as well as to run vehicle license plate recognition systems (e.g. Connelly, 2012; Miller, 2006; Richtel, 2010).

Connelly (2012) observed that most of the technology located in a patrol vehicle is stand-alone and that integrating some of these systems into multifaceted units may reduce driver distraction. For instance, he suggested placing a hand-controlled device placed between the front seats of the patrol vehicles for officers to simultaneously operate the lights, sirens, and radios. However, Miller (2006) acknowledged that the ergonomics of police vehicles are important factors in causing collisions, as equipment located away from the dashboard requires the driver to turn their attention away from the road. Instead, a system like a touchscreen or computer console that integrates the operation of various pieces of equipment could be mounted onto the dashboard of a patrol vehicle (Connelly, 2012; Miller, 2006). For instance, a system could be developed for the MDT where one-button controls on the screen could be used to operate the lights, siren, and radio.

In addition, or alternatively, other forms of technology can reduce the chances that driver distraction will result in a collision. For instance, anti-collision warnings sound an alarm or turn on a light on the dashboard when the vehicle gets too close to another object (Connelly, 2012; Kessler, 2014). Although a recent article suggested that by 2020 such technology may cost as little as $350 (Kessler, 2014), the cost of purchasing and maintaining this technology in a fleet of police vehicles is likely prohibitive for its regular use currently. Alternatively, this technology may be deployed more cost-effectively if used specifically with those officers with an increased tendency to be involved in collisions, as discussed below.

### POINT ACCUMULATION SYSTEM

While Docking and colleagues (2007) advised re-training all police officers every three to five years, this may be cost prohibitive for a large agency, such as the RCMP. Alternatively, driver re-training or re-certification may be more effectively used if applied strategically to those most in need. Some police officers are involved in motor vehicle collisions more often than others. Cohen and colleagues' (2009) research with the Burnaby RCMP found that one-third of members involved in a collision were also involved in a collision the previous year, and 22% of members involved in a collision were involved in two additional previous crashes. One option to selectively re-certify is to re-assess driving skills in all police members found partly or fully at fault for a motor vehicle collision. Alternatively, another option is to utilize a point accumulation system where, similar to how the Motor Vehicle Branch assigns demerit points to citizens who are speeding or involved in at-fault collisions, the police officer receives demerit points with each collision, with more points being given if the collision was their fault. Once an officer reaches a predetermined number of points, they would be prevented from driving until recertified. In addition, as suggested above, anti-collision technology may be a good investment for these particular officers.

### SEAT BELTS

Although not a cause of motor vehicle collisions, to reduce the risk of harm, it is important that police agencies emphasize the importance of wearing seat belts while in the vehicle. In Noh's (2011) analysis of law enforcement officer deaths between 1980 and 2008, 42% of officers killed in motor vehicle collisions were not wearing seat belts or other restraints. Police officers may object to wearing seat belts for reasons including that their gun belt is too bulky for the belt to sit upon, it prevents them from quickly jumping out of the vehicle when reaching a scene, and that it limits their ability to quickly respond in the event of an ambush (Bustamante, 2013; Miller, 2006; Page, 2007). Of note, Bustamante's (2013) recent review of the use of safety belts among members of the Los Angeles Police Department found no evidence of such tactical limitations. Furthermore, statistics demonstrate a statistically significant increased risk of injury or death when seat belts are not worn, as well as significantly higher damage costs (Bustamante, 2013; Citrowske et al., 2011; von Kuenssberg Jehle et al., 2005). These findings have led some agencies to mandate the wearing of seat belts, consistent with the IACP's directive in their Manual of Police Traffic Services Policies and Procedures (Batiste et al., 2011; Bustamante, 2013; Page, 2007). Other agencies have sought to increase awareness and education about the importance of wearing a belt while on the road (Halsey, 2012).

## Current Study Methodology

The current study sought to describe RCMP police motor vehicle collisions occurring in Surrey with the intention of providing guidance on techniques for collision reduction that can be adopted by the Surrey RCMP. The primary source of data for this report is MV6020 forms. The database includes MV6020 information for every Surrey detachment police-involved collision that occurred between January 1, 2011 and December 31, 2013. According to procedures set out by the Insurance

Corporation of British Columbia (ICBC), an MV6020 is required when a collision results in death, injury, or property damage exceeding $1,000 ($600 for a motorcycle). For police involved collisions, Surrey RCMP policy states that an MV6020 is not required where there is no third party involvement (e.g. single vehicle police car crash, collisions involving two police vehicles, but no civilians or civilian vehicles). The MV6020 form allows members attending a motor vehicle collision to record critical and detailed information about the nature and characteristics of the collision and the parties involved.

The Surrey RCMP was also able to provide a database of less serious accidents, those that do not meet the inclusion criteria of the MV6020 for the same period. This database of "non-MV6020" accidents is considerably less extensive, and contains the following information: collision date; number of vehicles involved; the action being performed at the time of the collision (e.g. forward driving, reversing, or stopped); collision location (e.g. residential location, parking lot, or street); whether or not third parties were involved; and collision conditions (although this field contained data for only 11% of cases). The database also contains a brief narrative description of the circumstances surrounding the collision. Wherever it was feasible to do so, analyses were conducted on a combined dataset that included both MV6020 and non-MV6020 crashes. Where the data was not comparable, separate analyses were conducted. Many of the fields available on the MV6020, such as those related to injuries and damages, were not available for non-MV6020 collisions. In these cases, the analyses reflect only the MV6020 data.

Most of the variables included in the following analyses are straightforward. Still, a few require further explanation. One variable, the attribution of responsibility for the collision (fault), was not included on the MV6020 form. Following a review of the files, the RCMP provided information regarding fault in a separate dataset. Collision responsibility was assigned according to the following categories:

Member: Accident caused, partially or wholly, by carelessness or negligence of member.

Civilian: Accident caused entirely by the civilian driver.

Justified: Accident caused by a deliberate and justifiable action during pursuit or by any other acceptable hazard of police work.

None: No one at fault/Shared fault.

Given that Surrey is a very large city comprised of several smaller, semi-distinct communities, it is useful to disaggregate results by geographic location. The MV6020 forms include a variable for *police zone*, but this data was missing on 33% of the forms. However, the MV6020 forms also include a field for *accident location*. The data coverage for this field was much better, as 94% of the forms included address information. The addresses recorded in the address location fields were geocoded, and each accident was assigned to one of seven Surrey communities.

The manner in which injuries were identified and recorded proved slightly problematic. The MV6020 form captures information pertinent to injuries in at least two places. First, the form has a field for *total injured*. According to this variable, 36 of the collisions in the dataset involved injuries to at least one party. In total, these 36 accidents produced injuries to 48 individuals. However, there is also a field related to the *location of the most severe injury*. The information in this field indicated that 53 individuals had been injured. In other words, there was a discrepancy between the two fields. To reconcile this discrepancy, the data was recoded so that an injury was recorded if either field included an indication of injury.

Finally, the MV6020 database had a considerable amount of missing data. While the number of missing cases was minimal, the lack of data for some variables was substantial. For example, the *severity* of the collision was recorded for 371 out of 377 vehicles, meaning that only 1.6% of cases were missing. In contrast, the actual level of vehicle *damage* was missing in almost 10% of cases. Much more problematic, 28% of reports were missing a primary collision code. To make the presentation of the findings as straightforward as possible, the figures in this report are based on valid percentages.[8] A detailed listing of missing values is shown in Appendix A.

## Research Results

### GENERAL FINDINGS

Between 2011 and 2013, Surrey RCMP officers were involved in 334 motor vehicle collisions, a rate of approximately 9.3 collisions per month. As demonstrated in Table 1, the number of collisions was fairly evenly distributed across the three year period. A little over half (56.6%) of these collisions were considered serious enough that members were required to submit MV6020 forms.

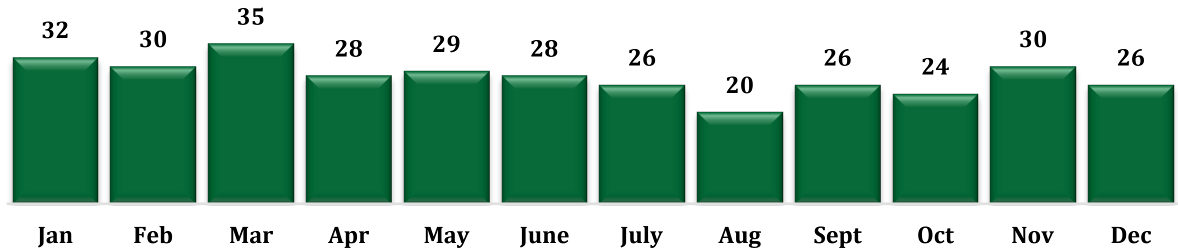
**TABLE 1: NUMBER OF COLLISIONS BY YEAR**

| | Total | | MV6020 Collisions | | Non-MV6020 Collisions | |
|---|---|---|---|---|---|---|
| | N = 334 | % | N = 189 | % | N = 145 | % |
| 2011 | 117 | 35.0 | 64 | 33.9 | 53 | 36.6 |
| 2012 | 103 | 30.8 | 58 | 30.7 | 45 | 31.0 |
| 2013 | 114 | 34.1 | 67 | 35.4 | 47 | 32.4 |

Figures 1 through 3 demonstrate the distribution of collisions across months, day of week, and hour of the day. The most notable feature of Figure 1 is the general consistency in the prevalence of collisions across months. For most months, the number of collisions hovered around the overall average of 27.8 collisions. Only March and August were noticeably above or below the average.

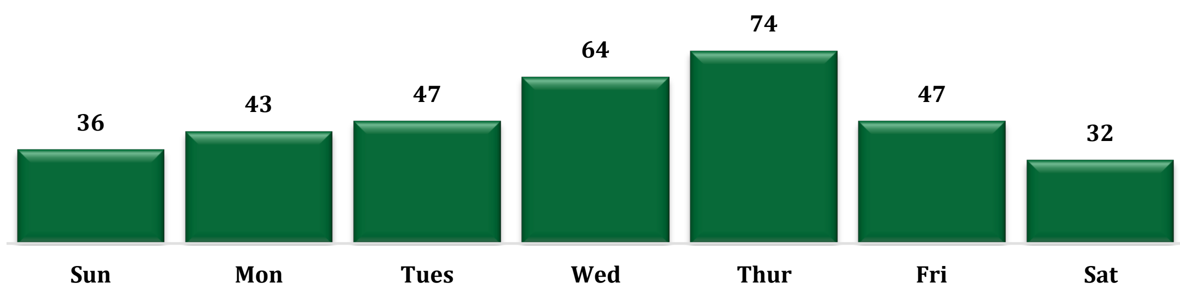
[8] The only exception to this is in Figure 4, where the inclusion of missing values was deemed to be particularly noteworthy for the purpose of accurate description.

**FIGURE 1: TOTAL NUMBER OF COLLISIONS BY MONTH (N = 334)**



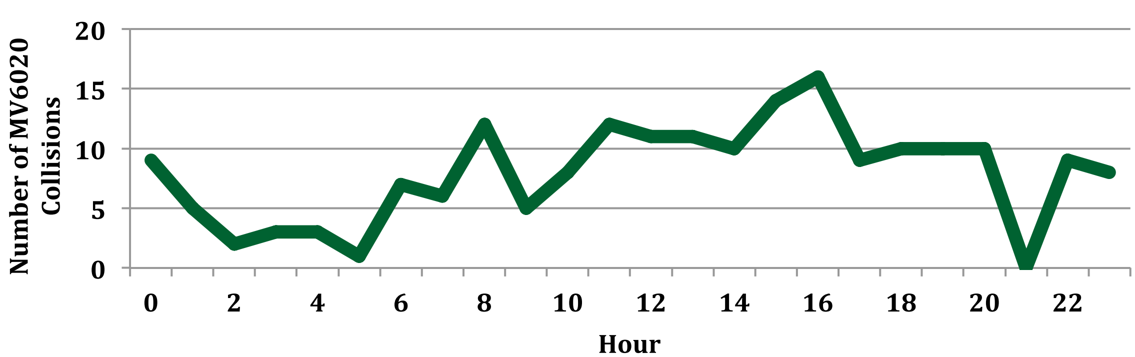

In contrast, Figure 2 highlights a much more definitive pattern in collisions across days of the week. Fewer collisions happened on the weekends, while the number of collisions increased though the week until they peaked on Thursdays.

**FIGURE 2: TOTAL NUMBER OF COLLISIONS BY DAY OF WEEK (N = 334)**




The distribution of collisions evident in Figure 3 reflects the workday practices of people in Surrey. Relatively few collisions took place in the early morning hours, whereas collisions were most likely during the afternoon. This also likely reflects vehicle volume in Surrey throughout the day.

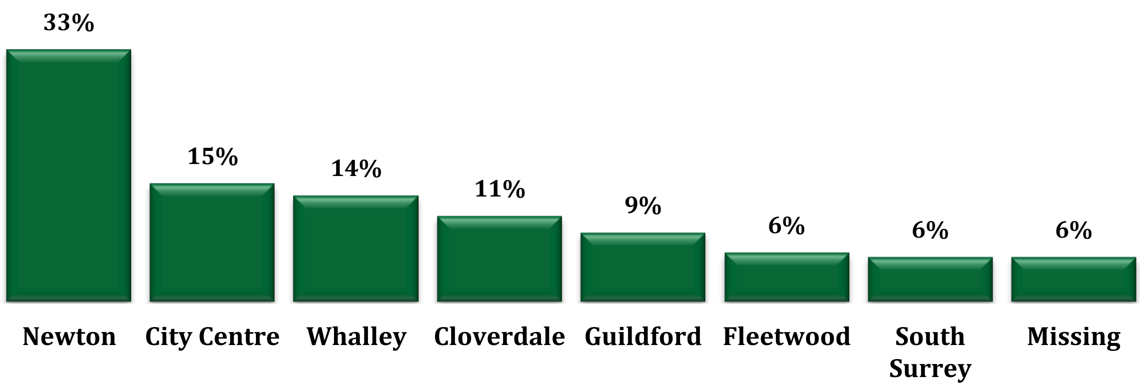
**FIGURE 3: NUMBER OF MV6020 COLLISIONS BY TIME OF DAY**



The data on month, day of week, and hour of the day was analysed by year. There did not appear to be any identifiable year-by-year patterns, which suggests that the remaining analyses in this report may be presented using aggregated data rather than presenting each year of data separately.

The geographic location of collisions is presented in Figure 4. Of note, one-third of collisions occurred in Newton. This was more than twice the percentages in City Centre and Whalley, the communities with the next highest collision levels. Conversely, the lowest proportion of collisions was found in Fleetwood and South Surrey. These differences most likely reflect Surrey RCMP deployment patterns and general traffic density throughout the city.

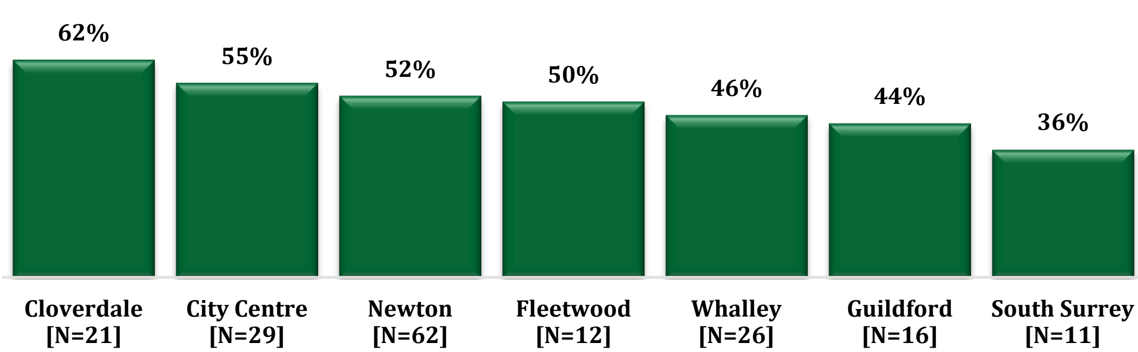
**FIGURE 4: PERCENTAGE OF COLLISIONS BY COMMUNITY [N=189]**




An important aspect of any motor vehicle accident is the determination of culpability. In this study, determination of fault was available only for the MV6020 accidents. In 98% of the MV6020's, one party to the collision was identified as responsible. Police officers were "at fault" in 52% of the collisions, and in 43% of the cases, a civilian was deemed responsible for the collision.

As demonstrated in Figure 5, there was substantial variation in the attribution of police culpability across communities. Police officers were responsible for collisions far more often in Cloverdale (62%) or City Centre (55%) than in South Surrey (36%) or Guildford (44%). The potential reasons for the disparities will be investigated throughout this report.

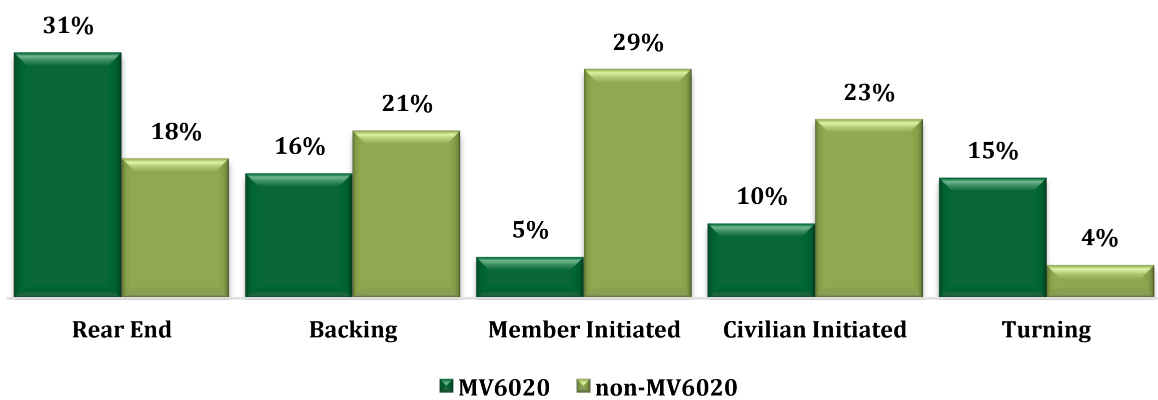
**FIGURE 5: PERCENTAGE OF COLLISIONS WITH POLICE AT FAULT BY COMMUNITY**



Each MV6020 collision is categorized according to a Primary Collision Code (PCC). These codes provide a shorthand description of the nature of the collision event. This code was missing for 28% of MV6020 cases. However, utilizing other characteristics of the collision, including "pre-collision vehicle action" and "which party was at fault", we were able to create PCCs for the missing cases. The non-MV6020 collisions do not have associated PCCs. Instead, codes were derived from the brief narratives that accompanied the non-MV6020 reports.

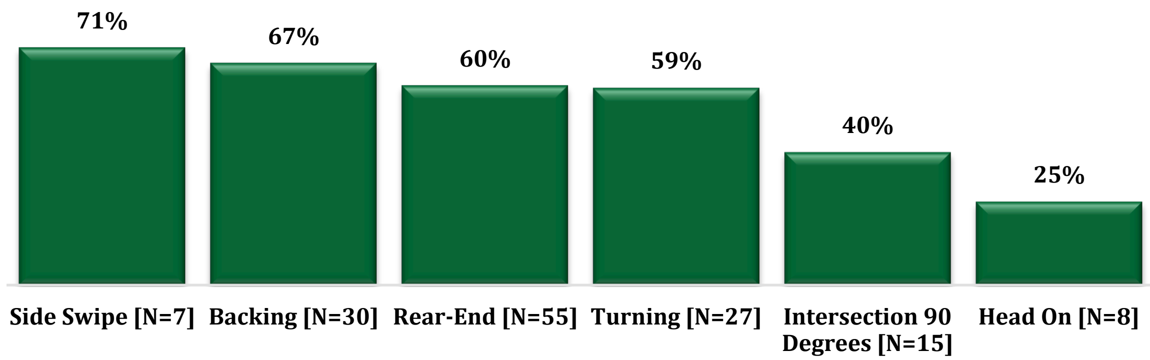
A review of the PCCs for all 334 collisions indicated that there was no one dominant type of police-involved accident. One-quarter of all crashes involved one vehicle rear-ending another, while another 18% involved a vehicle backing up. A collision while at least one vehicle was turning accounted for 11% of all collisions, while an intersection 90 degrees (5%), being sideswiped (3%), or a head on collision (2%) accounted for a small proportion of collisions. Together, collisions classified as being "member initiated" (16%) or "civilian initiated" (15%) accounted for nearly one-third of collisions. The comparison of MV6020 and non-MV6020 collisions shown in Figure 6 suggests that these designations were much more prevalent for less serious (i.e. non-MV6020) collisions. "Member initiated" collisions generally involved police vehicles hitting posts, poles, or barriers, or driving into a ditch, while "Civilian initiated" crashes were normally characterized as "PC struck/bumped by civilian/suspect vehicle".

**FIGURE 6: PRIMARY COLLISION CODE - MV6020 COMPARED TO NON-MV6020 COLLISIONS**



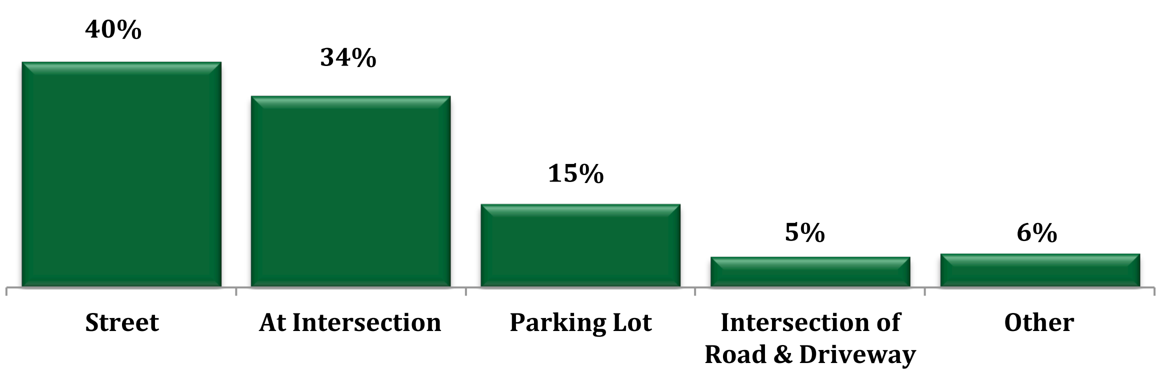

When considering just the MV6020 collisions for which a member was considered responsible and the type of collision was clearly identified, police culpability was widely divergent across different collision types (see Figure 7). For example, where MV6020 collisions involved sideswipes or the vehicle backing up, members were much more commonly found to be at fault (71% and 67% of the time, respectively). But, civilians were much more likely to cause other types of collisions, such as head on (75%) or intersection 90 degree crashes (60%). This distinction is important because, as this report will discuss later, type of accident correlates with collision seriousness.

**FIGURE 7: PRIMARY COLLISION CODE WHEN MEMBER WAS AT FAULT (N = 142)**




Both MV6020 and non-MV6020 files included information on the type of crash location. However, the location codes did not match; the location codes for MV6020 collisions were more detailed than those provided for non-MV6020 collisions. To preserve as much detail as possible, separate analyses have been provided for MV6020 and non-MV6020 collisions. The various locations at which MV6020 collisions occurred are captured in Figure 8. Approximately three-quarters of collisions happened at intersections or on the street, while a further 15% took place in parking lots.

**FIGURE 8: MV6020 COLLISION LOCATIONS**




In Table 2, collision locations are analyzed in relation to collision type to provide a clearer picture of what is occurring at the various locations.[9] When collisions transpired on the street or at street intersections, they most often involved one vehicle hitting the other from behind. The reverse is also true in that rear-end collisions almost always (90%) occurred on the street or at an intersection. Beyond rear-end incidents, street collisions were most likely to be civilian initiated contacts or to entail turning or backing up. Parking lot collisions also commonly involved backing up (56%).

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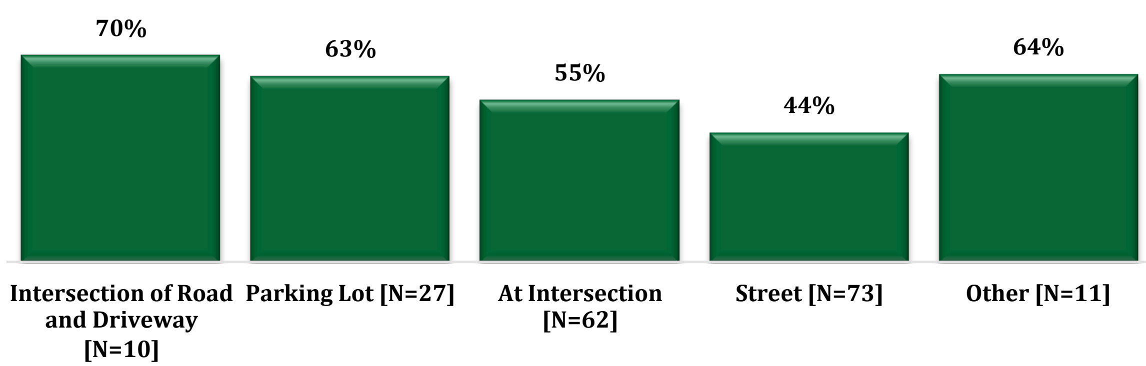
[9] The percentages in Table 2 correspond to Collision Locations (the columns).

**TABLE 2: COLLISION LOCATION BY COLLISION TYPE – MV6020 COLLISIONS (N = 183)**

| | Between Intersection | At Intersection | Parking Lot | Intersect Between Road and Driveway | Other | Total |
|---|---|---|---|---|---|---|
| Rear-End | 29<br>39.7% | 24<br>38.7% | 2<br>7.4% | 1<br>10.0% | 3<br>27.3% | 59<br>32.2% |
| Backing Up | 8<br>11.0% | 2<br>3.2% | 15<br>55.6% | 2<br>20.0% | 2<br>18.2% | 29<br>15.8% |
| Member Initiated | 6<br>8.2% | 3<br>4.8% | 1<br>3.7% | 0<br>0.0% | 0<br>0.0% | 10<br>5.5% |
| Civilian Initiated | 11<br>15.1% | 4<br>6.5% | 1<br>3.7% | 0<br>0.0% | 0<br>0.0% | 16<br>8.7% |
| Turning | 9<br>12.3% | 14<br>22.6% | 2<br>7.4% | 3<br>30.0% | 1<br>9.1% | 29<br>15.8% |
| Intersection 90 Degrees | 0<br>0.0% | 11<br>17.7% | 1<br>3.7% | 2<br>20.0% | 1<br>9.1% | 15<br>8.2% |
| Side Swipe | 2<br>2.7% | 0<br>0.0% | 2<br>7.4% | 1<br>10.0% | 1<br>9.1% | 6<br>3.3% |
| Head On | 1<br>1.4% | 1<br>1.6% | 3<br>11.1% | 1<br>10.0% | 1<br>9.1% | 7<br>3.8% |
| Justified (Intentional) | 3<br>4.1% | 0<br>0.0% | 0<br>0.0% | 0<br>0.0% | 0<br>0.0% | 3<br>1.6% |
| Other | 4<br>5.5% | 3<br>4.8% | 0<br>0.0% | 0<br>0.0% | 2<br>18.2% | 9<br>4.9% |
| TOTAL | 73 | 62 | 27 | 10 | 11 | 183 |

According to Figure 9, police fault for MV6020 collisions was distributed differentially across locations. For example, of all the collisions that occurred at an intersection of a road and a driveway (n = 10), members were found at fault in 70% of these collisions, and they were found at fault for 63% of all collisions (n = 27) that occurred in a parking lot. Conversely, members were found at fault in a minority of collisions (44%) that occurred on the street.

**FIGURE 9: MV6020 COLLISION LOCATIONS WHEN MEMBER WAS DEEMED AT FAULT (N = 183)**




As noted above, the recorded locations codes available for non-MV6020 collisions were more limited. Where data was available, two-thirds of collisions occurred on the street, while one-third occurred in parking lots. These proportions are very similar to what we would find if the MV6020 locations were aggregated.

The relationship between collision locations and collision type for non-MV6020 cases is shown in Table 3.[10] Street collisions typically consisted of rear-end collisions, civilian initiated contact, or member initiated contact, while member initiated or backing up incidents dominated parking lot collisions. Looking across collision types, all rear-end collisions happened on the street, as did the majority of civilian initiated crashes (78%). Just over half of all member-initiated collisions (54%) occurred on the street. Conversely, slightly more than half of backing up incidents (57%) took place in parking lots.

**TABLE 3: COLLISION LOCATION BY COLLISION TYPE – NON-MV6020 COLLISIONS (N = 145)**

| | Street | Parking Lot | Residential Dwelling | Total |
|---|---|---|---|---|
| Rear-End | 25<br>25.8% | 0<br>0.0% | 0<br>0.0% | 25<br>17.2% |
| Backing Up | 13<br>13.4% | 17<br>36.2% | 0<br>0.0% | 30<br>20.7% |
| Member Initiated | 22<br>22.7% | 18<br>38.3% | 1<br>100% | 41<br>28.1% |
| Civilian Initiated | 25<br>25.8% | 7<br>14.9% | 0<br>0.0% | 32<br>22.1% |
| Turning | 4<br>4.1% | 2<br>4.3% | 0<br>0.0% | 6<br>4.1% |
| Intersection 90 Degrees | 1<br>1.0% | 0<br>0.0% | 0<br>0.0% | 1<br>0.7% |
| Side Swipe | 1<br>1.0% | 2<br>4.3% | 0<br>0.0% | 3<br>2.1% |
| Justified (Intentional) | 2<br>2.1% | 1<br>2.1% | 0<br>0.0% | 3<br>2.1% |
| Missing | 4<br>4.1% | 0<br>0.0% | 0<br>0.0% | 4<br>2.8% |
| TOTAL | 97 | 47 | 1 | 145 |

The portion of non-MV6020 collisions where members were at fault was quite similar to the results for the MV6020 collisions. Members were deemed to be at fault for the one residential dwelling crash, 75% of the parking lot collisions, and 50% of the street collisions.

Data related to the type of location in which the collision occurred was only available for the MV6020 collisions. Slightly more than half of these collisions (53%) occurred in an urban residential location, while approximately one-third of collisions (34%) occurred in business or shopping locations.

## VEHICLE INFORMATION

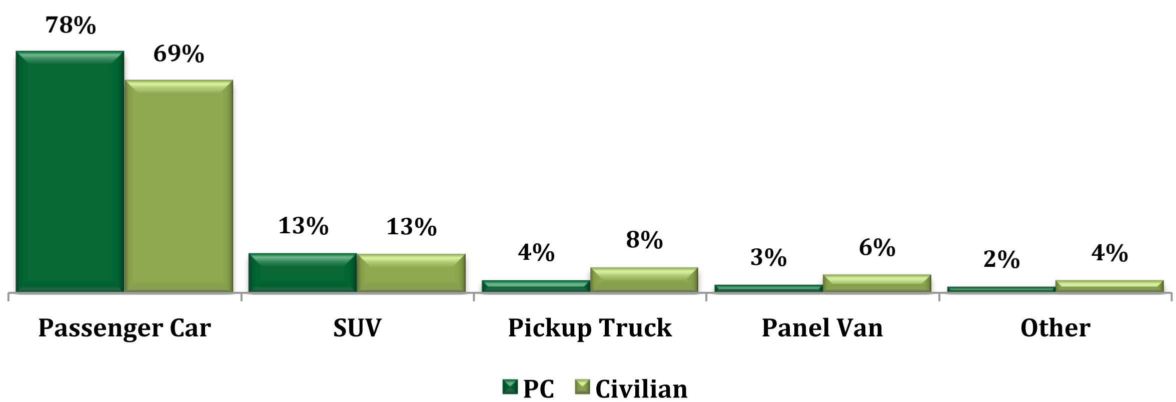
Examining all of the data, most commonly collisions involving a police motor vehicle were of the standard two-vehicle variety (70%). Moreover, slightly more than one-fifth (22%) involved just the police motor vehicle. The remaining 8% involved at least three vehicles. However, some variation

[10] The percentages in Table 3 correspond to Collision Locations (the columns).

between more and less serious crashes was evident. The more serious MV6020 accidents were much more likely to involve three or more vehicles (12%) and only 14% involved just the police motor vehicle. The remaining 74% involved two vehicles. In contrast, non-MV6020 collisions featured a proportionately higher rate (32%) of a collision than involved just a police motor vehicle, while only 64% involved two vehicles. Only 4% of non-MV6020 collisions involved three or more vehicles.

The types of vehicles involved in MV6020 collision are presented in Figure 10. As expected, while the overwhelming majority of police motor vehicles were passenger cars, this was also true of the civilian vehicles. For the most part, the distributions were very similar between the police motor vehicles and the civilian vehicles.

**FIGURE 10: TYPES OF VEHICLES IN MV6020 COLLISIONS**

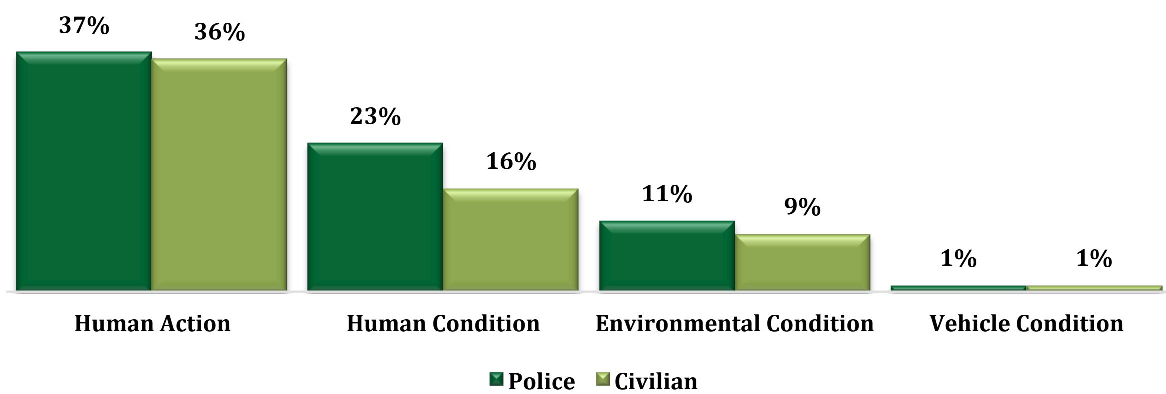



Slightly more than one-third of collisions (35%) resulted from emergency situations. While considerable, this is the not the single largest vehicle usage category. Instead, half of the MV6020 collisions happened during routine police activity, but not during an emergency. Moreover, in a small number of cases, collisions occurred when the member involved was using the vehicle for a "personal reason" (6%). The same proportion of collisions occurred while the police motor vehicle was being used for "business" reasons, although it is unclear what this specific classification refers to. Finally, only 3% of MV6020 collisions occurred while the police motor vehicle was parked.

## CONTRIBUTING FACTORS TO POLICE MOTOR VEHICLE COLLISIONS

The MV6020 form records four categories of contributing factors: human actions, human conditions, environmental conditions, and vehicle conditions. Human actions refer to things the driver was doing, such as following too close to the vehicle in front of them or failing to properly yield. Human conditions refer to things like driver inattention or driver distraction. Environmental conditions refer to things like the weather or the condition of the road. Thus, there are many factors that may contribute to a police motor vehicle collision. At least one contributing factor was identified in 141 of the 189 MV6020 collisions used in this study (75%). Of those 141 collisions, a member was identified as playing a contributing role in 59% of collisions, while a civilian was identified in 47% of collisions.[11] As demonstrated in Figure 11, the most typically cited type of contributory factors for both the police and civilians were human actions (37% and 36%, respectively) followed distantly by human conditions (23% and 16%, respectively), and environmental conditions (11% and 9%, respectively). Of note, very few collisions were caused, in whole or in part, by the vehicle failing in some way, like a flat or blown out tire.

**FIGURE 11: PERCENTAGES OF COLLISIONS WITH CONTRIBUTING FACTORS**

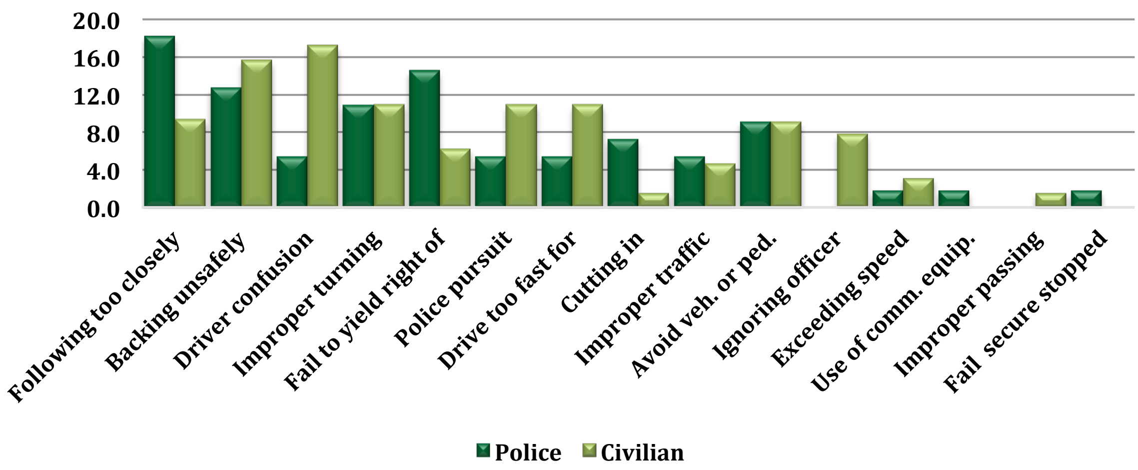



The specifics of each type of contributory factor are presented in Figures 12 to 14.[12]Human actions that contributed to collisions were present in 97 out of 189 cases (51.3%). Figure 12 indicates that, in terms of human actions, the factors most likely to be attributed to members were following too closely (18%), failing to yield the right of way (15%), backing up unsafely (13%), improper turning (11%), and attempting to avoid another vehicle or pedestrian (9%). While backing up unsafely was also routinely noted as a contributing factor for civilian drivers (16%), their actions were more likely than the police to be characterized by driver confusion (17%), driving too fast (11%), or becoming involved in a police pursuit (11%).

[11] As there can be more than 1 contributing factor per collision, the total percentage of contributing factors will not equal 100%.

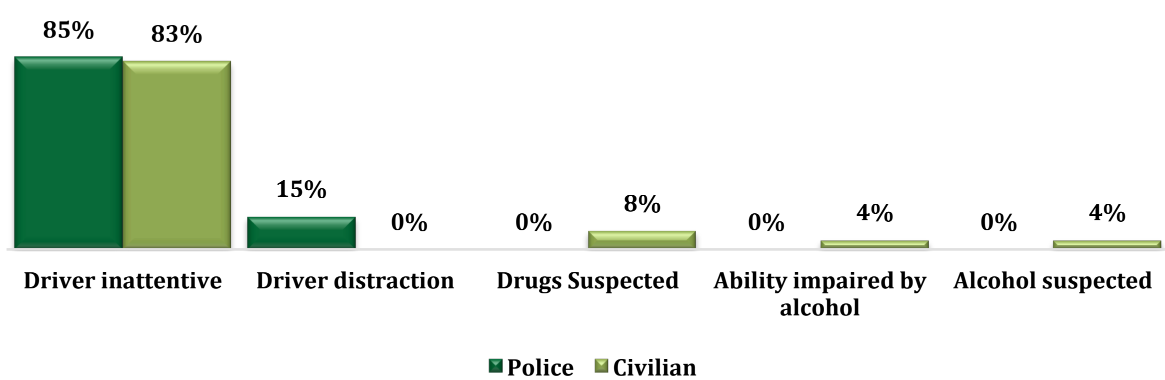
[12] As a result of the small number of relevant cases, separate breakdown for "Vehicle Condition" is provided.

**FIGURE 12: CONTRIBUTING FACTORS - HUMAN ACTIONS**



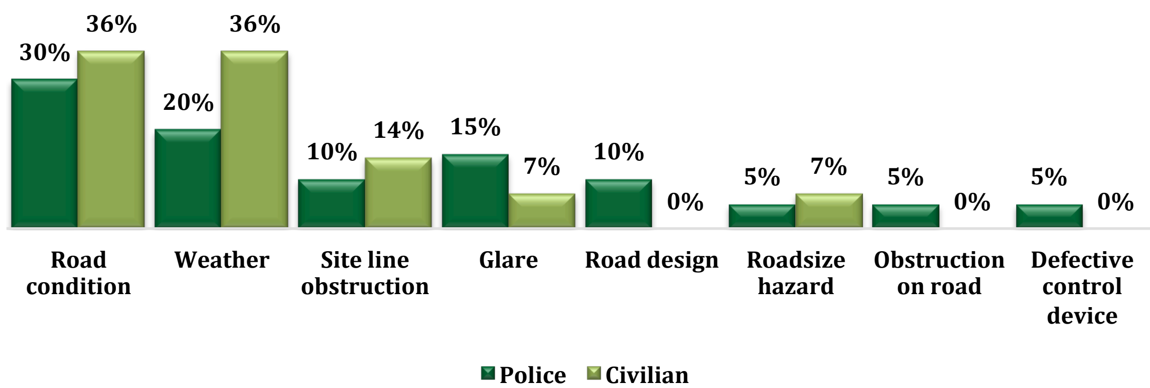

About 30% of collisions involved human conditions as a contributing factor. When collisions were partially or wholly attributable to human conditions, the most commonly cited factor was driver inattention (Figure 13). The remaining human conditions showed a stark divide between members and civilians. It is interesting to note that 15% of the human conditions contributing factors for members was driver distraction. As supported by the literature, it is possible that the MDT and the use of phones are distracting members while driving. Conversely, given the attention that the media and public safety agencies have placed on making drivers aware of the risks and the provincial legislation making it illegal to use smart phones while operating a motor vehicle, it is noteworthy that none of the collisions for which a civilian was deemed at fault was the result of distracted driving. Moreover, in approximately 17% of collisions, civilians were found or suspected to be under the influence of drugs or alcohol.

**FIGURE 13: CONTRIBUTING FACTORS - HUMAN CONDITIONS**



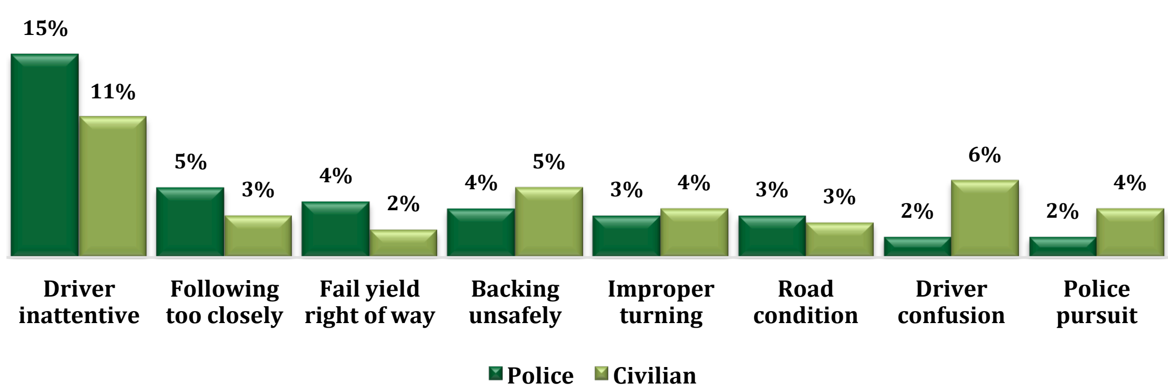

Environmental conditions were deemed to play a role in 25 collisions (13%). While only contributing a small degree to the causes of collisions, among potential environmental conditions, the two that were most notable were road conditions and weather (Figure 14). Together, they comprised over 70% of the environmental conditions contributing to the collision for civilians and 50% for members. There were several environmental conditions, including road design, obstruction on road, and defective control device, that were only associated with members.

**FIGURE 14: CONTRIBUTING FACTORS - ENVIRONMENTAL CONDITIONS**



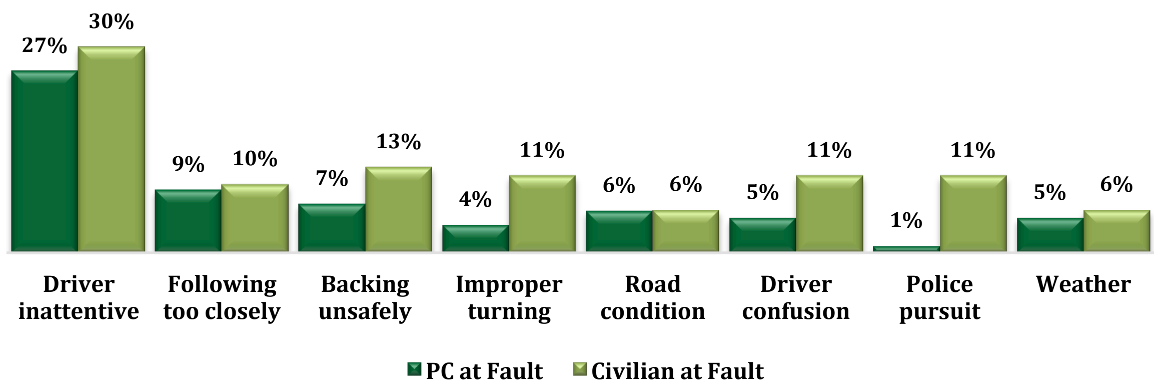

Analyzing contributing factors by category allows for broad description, but it does not provide a sense of proportion. To evaluate the “most important” contributing factors, the top 5 most frequently cited factors for both civilians and the police were combined into a single list. As several of the items overlapped, this process ultimately produced a distinct “Top 8” list of contributing factors. Figure 15 shows that driver inattentiveness was the single largest factor as 15% of serious crashes involved insufficiently attentive members and 10% involved inattentive civilians. Driver confusion and backing up unsafely were the second and third most common factors for civilians, while following too closely and failing to yield the right of way were the next most frequent factors for members.

**FIGURE 15: TOP 8 CONTRIBUTING FACTORS TO PMVC**



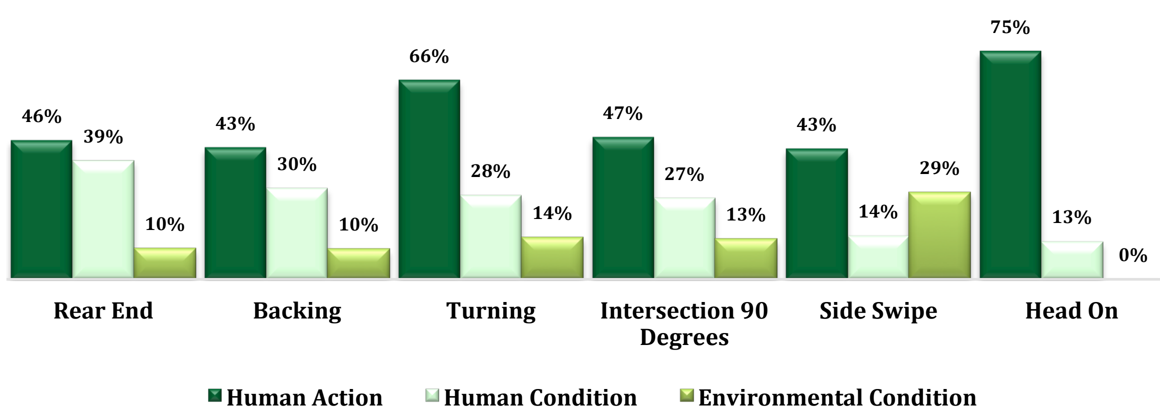

The same “Top 5” procedure was used to examine the relationship between contributing factors and collision responsibility. Figure 16 highlights the even more noticeable effect of driver inattention. Over one-quarter (27%) of police at fault collisions involved inattention; however, this was slightly lower than for civilian at fault collisions (30%). Consistent with the data presented above, following too closely and backing up unsafely also ranked high for collisions when members were at fault. When civilians were at fault, several factors remained important, including backing up unsafely and driver confusion.

**FIGURE 16: TOP 8 CONTRIBUTING FACTORS FOR PMVC BY FAULT**



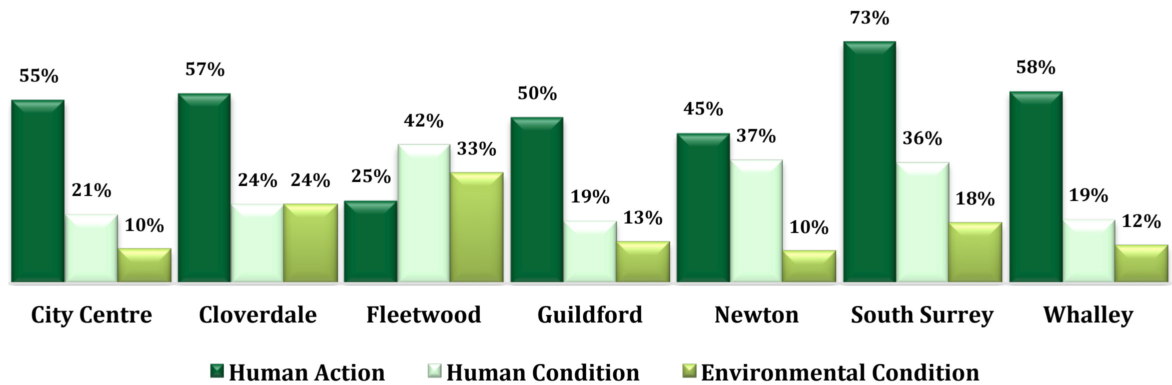

The relationship between type of collision and contributing factors is summarized in Figure 17. In some respects, there is a degree of consistency across collision types. For example, human actions were the most commonly noted factor for each category of collision. And, with the exception of sideswipe collisions, human conditions were the second most frequency factors. Still, there is some variation that merits further attention. For example, the presence of human action contributing factors ranged from a low of 43% for sideswipes and backing up to a high of 75% for head on collisions. Similarly, the type of collision most frequently attributed to human conditions was a rear-end collision. Sideswipe collisions were more than twice as likely as any other type of accident to be produced by environmental conditions, while these conditions did not play a role in any of the head on crashes.

**FIGURE 17: COLLISION TYPE BY CONTRIBUTING FACTOR CATEGORIES**



The pattern of findings for the distribution of contributing factors across communities (see Figure 18) was consistent with the results in Figure 17, with the lone exception of the very low rate of human actions present in Fleetwood.

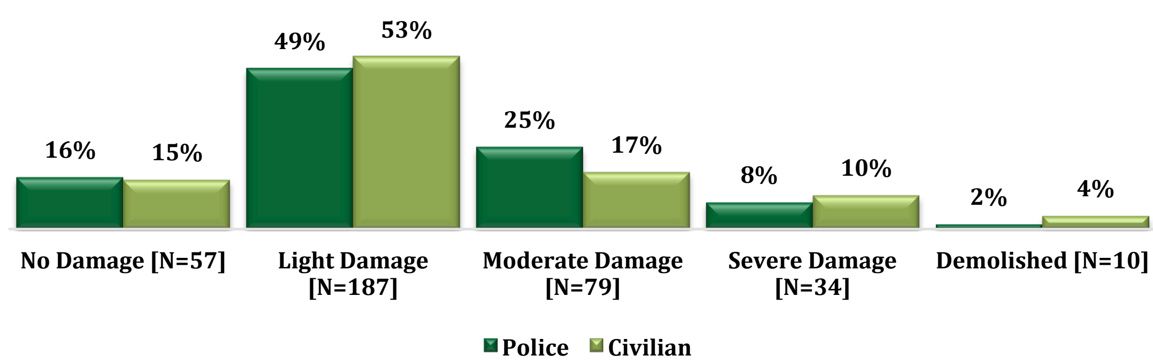
**FIGURE 18: COMMUNITIES BY CONTRIBUTING FACTOR CATEGORIES**




## THE SEVERITY OF COLLISIONS INVOLVING A POLICE MOTOR VEHICLE

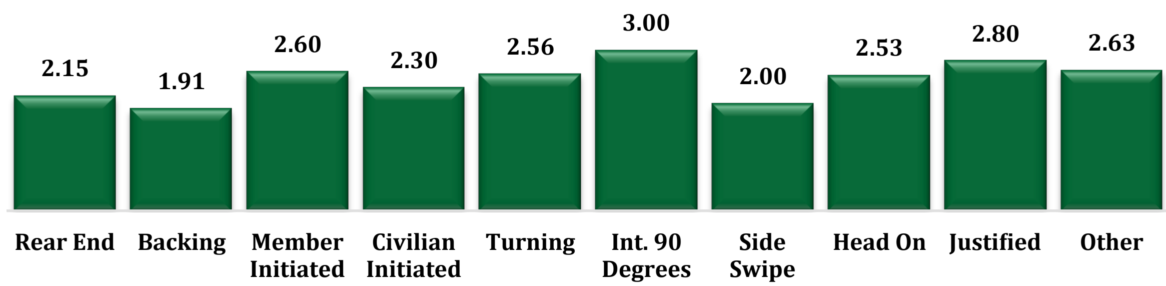
Data on the severity of collisions involving police motor vehicles was available for 367 vehicles (2.7% missing) from the MV6020 database, which included both police and civilian vehicles. Of these vehicles, two-thirds sustained no (16%) or light damage (51%), moderate or severe damage was recorded in 21% and 9% of cases respectively, and ten vehicles (3%) were demolished. In accordance with the MV6020, level of severity was ranked on a scale from 1 (No Damage) to 5 (Demolished). The average severity score was 2.32, suggesting an average damage level between "light" and "moderate" damage. As demonstrated in Figure 19, there were only very minor differences in the degree of damage to the vehicle when comparing police motor vehicles with civilian vehicles. Overall, the mean levels of severity for police vehicles (2.30) and civilian vehicles (2.35) were almost identical.

**FIGURE 19: COMPARISON IN THE DEGREE OF DAMAGE TO VEHICLES INVOLVED IN A COLLISION**



Different types of collisions produced distinct differences in levels of severity. As demonstrated in Figure 20, on average, backing up (1.91), sideswipes (2.00), and rear-end (2.15) collisions produced less damage than other collision types. At the other end of the spectrum, “intersection 90 degree” accidents caused the highest average levels of damage (3.00). Justified collisions were also quite serious (2.80). This is not surprising given that justified collisions involve intention on the part of the member to collide with the other vehicle(s).

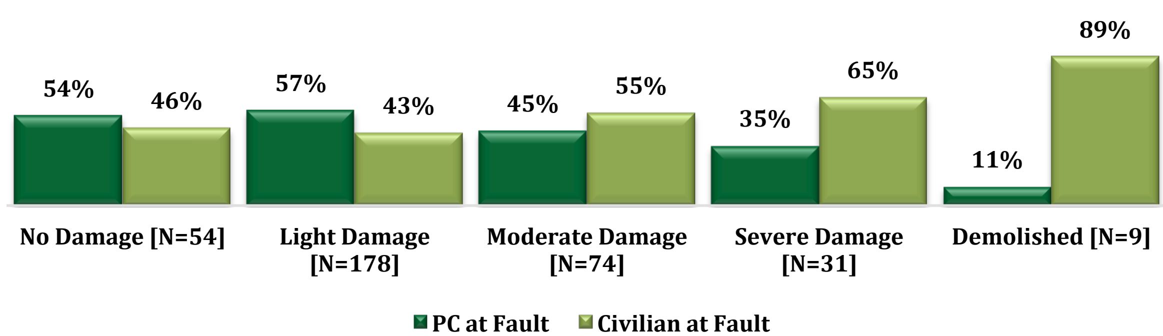
**FIGURE 20: AVERAGE SEVERITY LEVEL OF DAMAGE BY COLLISION TYPE**




While useful in providing an overall description, averages can obscure important variations. In terms of the types of collisions that resulted in severe damage or the demolition of the vehicle, the most serious collisions were those that involved “intersection 90 degree” crashes (23%), followed by rear-end collisions (18%) and collisions that occurred when at least one of the vehicles was turning (16%). Surprisingly, only 7% of the collisions that resulted in severe damage or the demolition of the vehicle were the result of a head on collision.

The association between collision severity and who was at fault is presented in Figure 21. Of note, a civilian at fault for the collision was overrepresented at the upper end of the damage continuum, especially with respect to severe damage and demolitions. Overall, compared to collisions for which a member was responsible, the average level of severity for civilian at fault crashes (2.47) was statistically significantly higher ($t = 3.05$, $p = .003$) than when a member was at fault (2.17). Further analyses indicated that this difference was due, at least in part, to civilian drivers being responsible for a greater number of serious collisions resulting from “turning”.

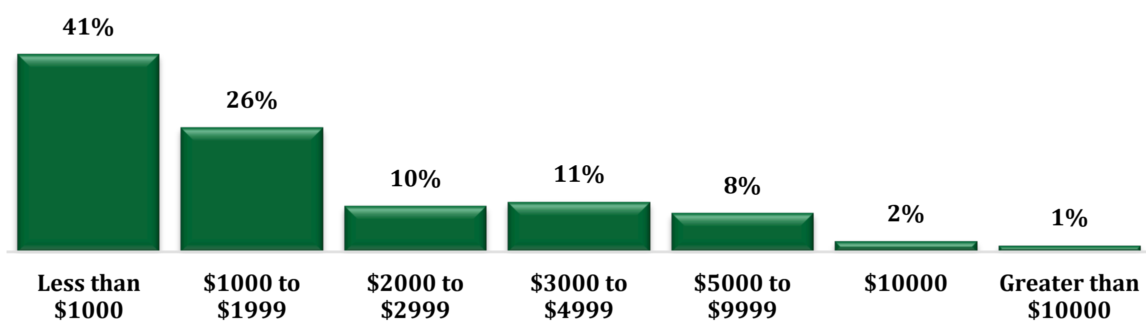
**FIGURE 21: COMPARISON OF THE DEGREE OF DAMAGE TO THE VEHICLE BY FAULT**



There were some small differences between communities with respect to the average severity levels of collisions across Surrey. The highest levels of damage to vehicles occurred in Guildford (2.50) and Cloverdale (2.49), followed by City Centre (2.44) and Whalley (2.31). The lowest levels of vehicle damage occurred in South Surrey (2.12) and Fleetwood (2.19). Secondary analyses suggested that South Surrey and Fleetwood both experienced a large proportion of relatively minor rear-end accidents, while in Cloverdale, those same types of crashes typically produced moderate damage. However, the differences in average severity levels were not statistically significant ($F$ = .873, $p$ = .515).

Another way to evaluate the seriousness of collisions is to examine the estimated monetary damage to vehicles. Figure 22 presents the distribution of damage for MV6020 collisions. The average estimated damage was $1,900 with a range of $0 to $20,000.[13] As expected, given the spread of severity data, damage was heavily skewed toward the lower bound of the distribution. In other words, approximately 40% of crashes caused less than $1,000 in damage. In fact, of these 141 cases, about 60% saw damages less than $500. Damage levels were comparable between police and civilian vehicles. The average damage to civilian vehicles ($2,050) exceeded that for police vehicles ($1,775), but the difference was not statistically significant.

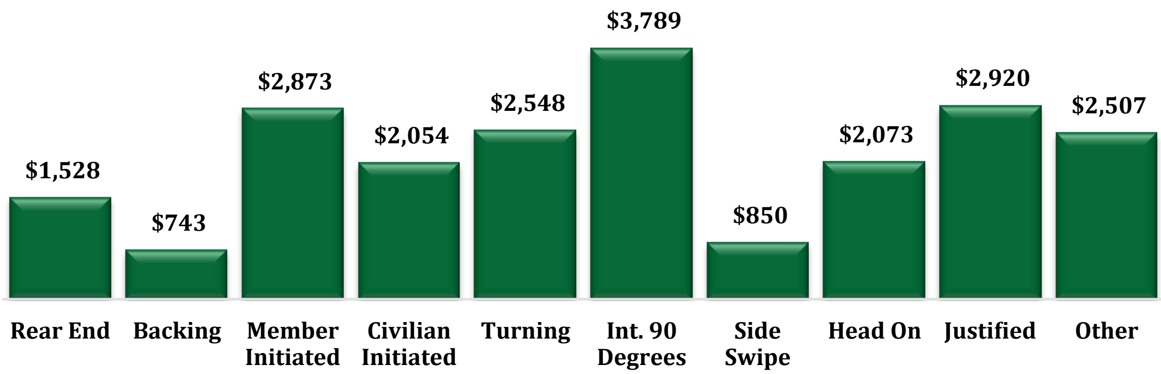
**FIGURE 22: MONETARY DAMAGE TO VEHICLES**




When differentiated by type of collision, the average damage to vehicles presented in Figure 23 parallel the severity results presented in Figure 20. The damage produced by backing up ($743), sideswipe ($850), or even rear-end collisions ($1,528) was substantially lower than the amount of damage associated to "intersection 90 degree" ($3,789), "justified" ($2,920), and member initiated ($2,873) collisions.

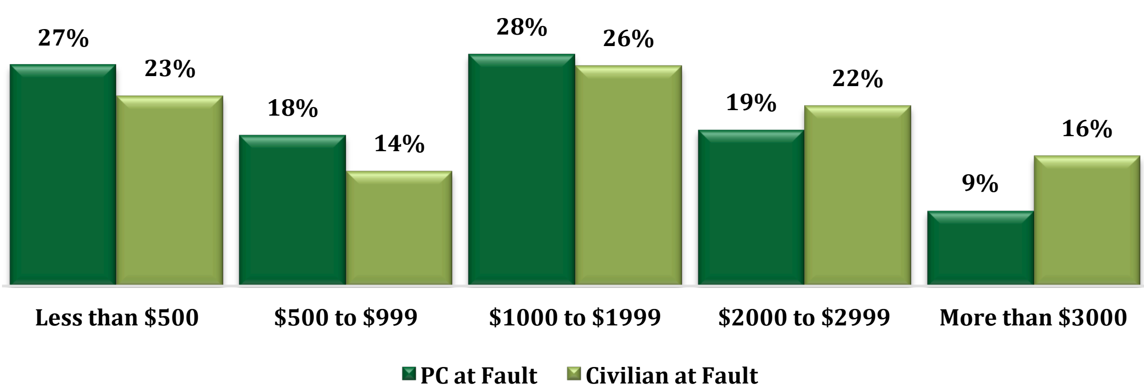
[13] Given the skew of the data, the median would normally be preferred over average as a summary measure of central tendency. However, the dominance of one damage category ($1,000) made meaningful comparisons between analytic subgroups impossible. As well, statistical tests were consistent, regardless of which measure of central tendency was used. For this reason, average damages have been presented.

**FIGURE 23: AVERAGE MONETARY DAMAGE BY COLLISION TYPE**




The relationship between collision damage and responsibility is presented in Figure 24. Civilian at fault collisions were once again overrepresented at the upper reaches of the damage spectrum, most noticeably with regard to damages greater than $3,000. The average damage to vehicles when civilian were deemed to be at fault ($2,240) was more than $600 higher than when members were responsible ($1,620). This difference was almost statistically significant ($t$ = 1.96, $p$ = .051).

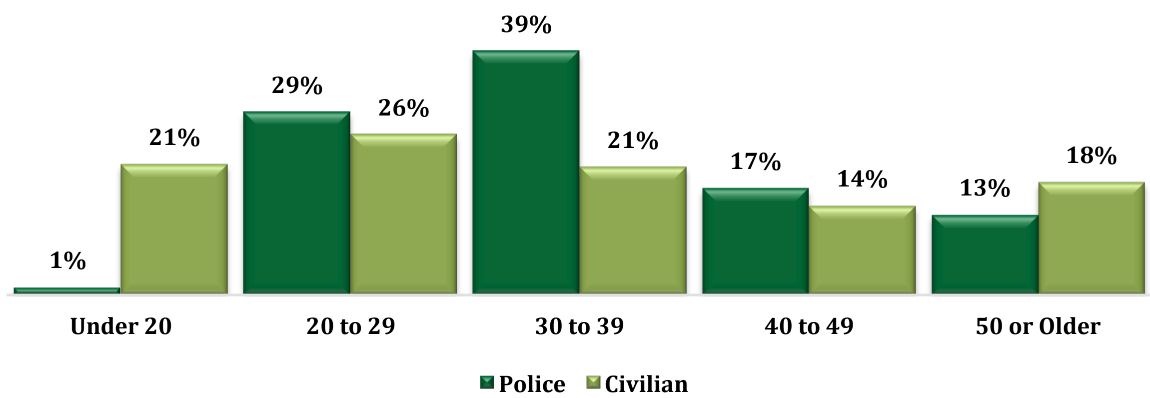
**FIGURE 24: COMPARISON OF MONETARY DAMAGE BY FAULT**




## DEMOGRAPHICS OF DRIVERS INVOLVED IN A PMVC

The 189 collisions involved 455 individuals. Over two-thirds (68%) of the individuals involved were males; this proportion was much higher for members (84%) than civilians (58%). Although the average ages for the members involved in a collision was 36 years old and 33 years old for civilians, the distribution showed distinctly different patterns (see Figure 25). Nearly 40% of police officers involved in collisions were between 30 and 40 years of age. This figure was essentially twice as large as the figure for civilians (21%). In contrast, over 20% of civilians were under the age of 20 years old. Civilians were also overrepresented in the over 50 age category, albeit to a less degree than the under 20 category.

FIGURE 25: AGES OF INDIVIDUALS INVOLVED IN COLLISIONS

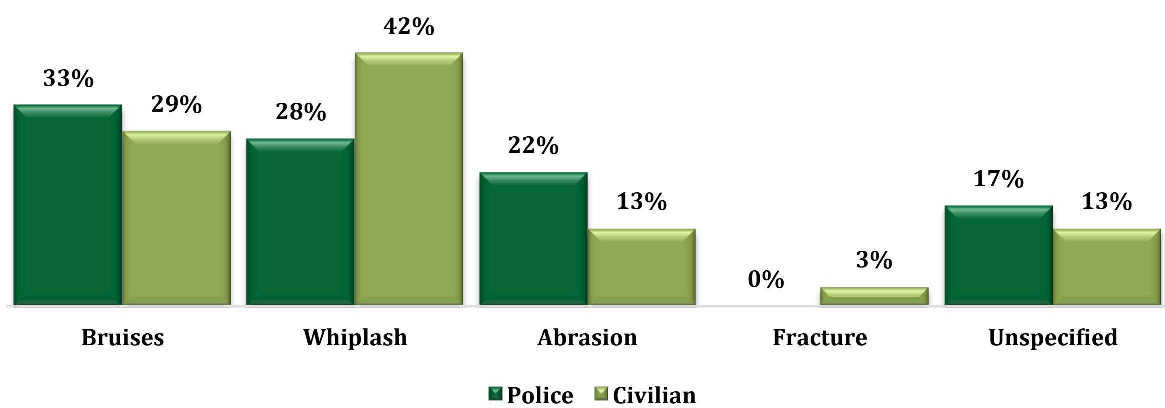



## INJURIES AS A RESULT OF A POLICE MOTOR VEHICLE COLLISION

An important indicator of collision seriousness is the number and nature of reported injuries. Of the 189 MV6020 collisions, 43 (23%) resulted in someone sustaining an injury. In fact, these 43 collisions resulted in a total of 53 people being injured. More specifically, of these 53 people, 18 were members, 31 were civilians, while for four people it was not possible to determine by the data whether they were members or not. Of note, civilians were more likely than members to be injured. More specifically, in 55% of collisions, only a civilian was injured compared to 34% of the collisions in which only a member was injured. In 11% of collisions, at least one member and one civilian was injured.

Police officers and civilians also differed somewhat with respect to the types and body locations of injuries sustained. As demonstrated in Figure 26, civilians most commonly suffered whiplash (42%), followed by bruises (29%) and abrasions (13%). Members' injuries were more equally distributed between bruises (33%), whiplash (28%), and abrasions (22%).

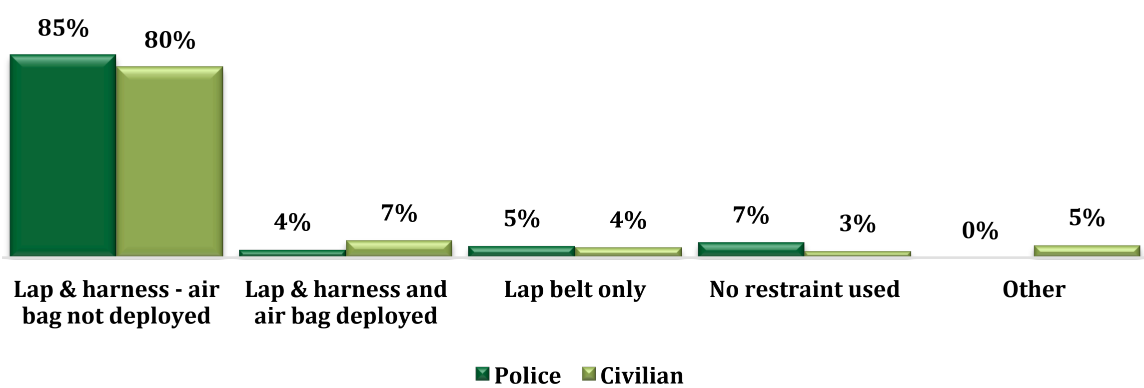
FIGURE 26: TYPE OF INJURY SUSTAINED IN PMVC



Importantly, members were much more apt to experience back injuries (56%) and injuries to other parts of the body (28%), and only rarely to the head (11%) and neck (6%), but given the proportion of civilians who experienced whiplash, it was not surprising that a higher proportion suffered head (19%), neck (29%), or back (26%) injuries. A nearly equal proportion of civilians also received injuries to other parts of their bodies (26%).

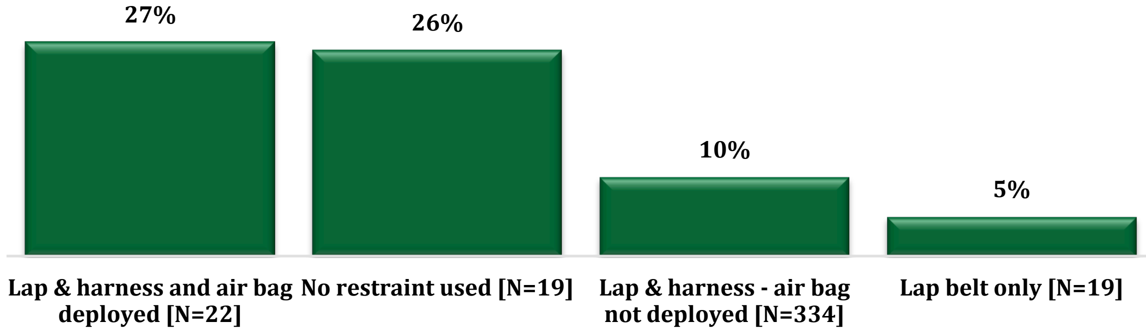
One factor that is relevant to whether an injury occurs as a result of a collision is the proper use or non-use of the vehicle's safety equipment. Figure 27 indicates that the vast majority of individuals involved in collisions (92%) were using some form of safety equipment, in most cases a full lap belt and harness system, at the time of the collision. Only 5% of individuals were not using a restraint. Figure 27 also demonstrates that members and civilians did not differ substantially in their use of safety equipment.

**FIGURE 27: USE OF SAFETY EQUIPMENT IN PMVC**



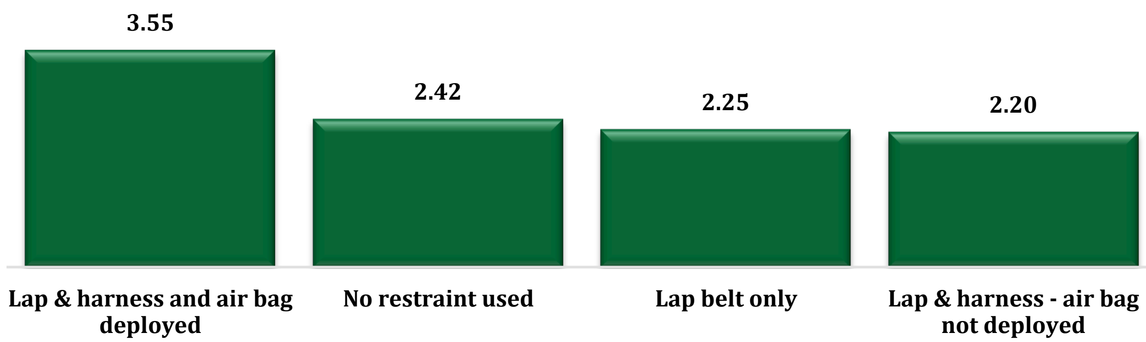

The relationship between the use of safety equipment and the likelihood of sustaining an injury in a collision is complicated. On the one hand, it is clear that the probability of being injured in a collision was elevated when no restraint was used. In Figure 28, slightly more than one-quarter (26%) of individuals who were not wearing a restraint were injured. By comparison, only 10% of individuals who were using some restraint system were injured. On the other hand, the likelihood of injury did vary substantially across the different restraint systems. At the lower end, where individuals were using the lap and harness and the air bag did not deploy (easily the most common scenario), only 1 in 10 individuals were injured. An even smaller proportion of individuals, about 1 in 20, were injured while they were wearing only a lap belt. In contrast, the proportion of individuals injured while using the lap and harness, but where the air bag did deploy, was roughly the same (27%) as when no restraint was used.

**FIGURE 4: PROPORTION OF INDIVIDUALS INJURED BY SAFETY EQUIPMENT USED**



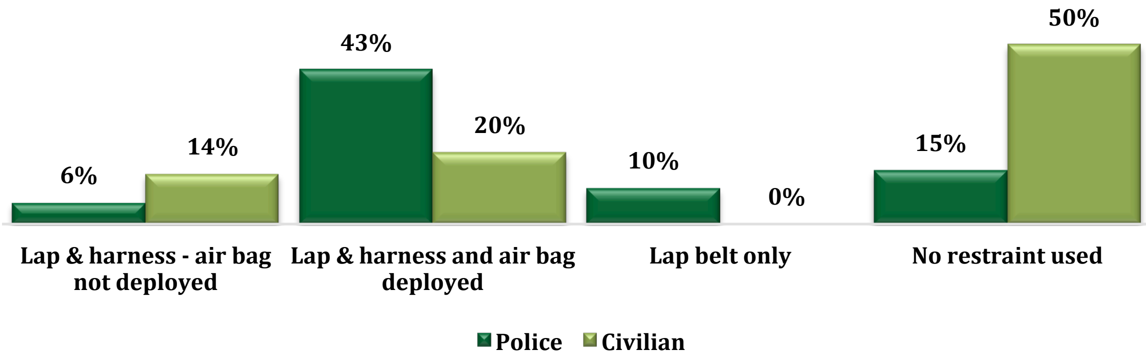

This apparent paradox may be explained by differences in collision severity. Figure 29 demonstrates that by far the most severe collisions where those in which the air bags deployed. Although the number of such cases is comparatively small, the severity of these collisions was, on average, more than 60% higher than for collisions in which air bags did not deploy. Compared with collisions where no restraint was used, air-bag-deployment collisions were 47% more severe. Simply put, the individuals who were not using a restraint were incredibly lucky. They undoubtedly would have experienced more serious injuries had they been involved in more severe collisions.

**FIGURE 5: AVERAGE LEVEL OF COLLISION SEVERITY BY SAFETY EQUIPMENT USED**




There are differences between members and civilians in patterns of injury across the use of safety equipment, although the small number of cases in some categories exacerbates the degree of these differences. For example, Figure 30 shows that, for typical collisions (i.e., lap and harness, but no air bag deployment), civilians were more than twice as likely to be injured. Civilians were also much more likely to be injured where no restraint was used, but the figure of 50% may be a bit misleading as it is based on six cases. Conversely, members were more than twice as likely to be injured in more serious collisions when air bags deployed.

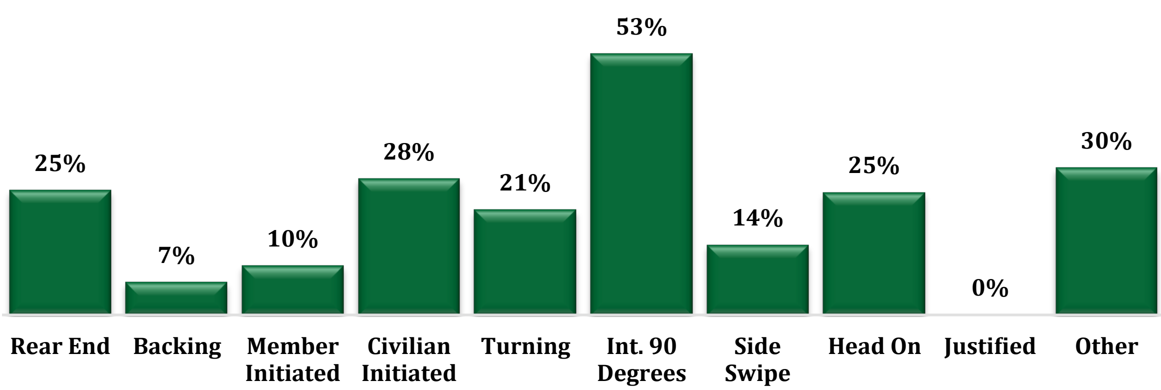
**FIGURE 30: PROPORTION OF POLICE AND CIVILIANS INJURED BY SAFETY EQUIPMENT USED**




The breakdown of injuries by collision type suggests a link between the type and location of injury and the type of collision in which the injury was sustained. In other words, of all the injuries sustained as a result of a police motor vehicle collision, 37% were rear-end collisions. Crashes at intersections, involving either 90-degree impacts (17%) or turning (13%), also resulted in a disproportionate number of injuries. Of note, only 6% of head on collisions, 6% of backing up collisions, and 4% of sideswipe collisions resulted in any injuries.

However, another way to understand the data is to examine each type of collision and consider the proportion that resulted in someone being injured. This analysis is presented in Figure 31 and reveals that, not surprisingly, 53% of the 90-degree collisions resulted in at least one person being injured. Moreover, one-quarter of both rear-end and head on collisions resulted in injury. As expected, injuries were far less prevalent in backing up (7%) and sideswipe (14%) crashes.

**FIGURE 31: COLLISION TYPE BY PROBABILITY OF INJURY**



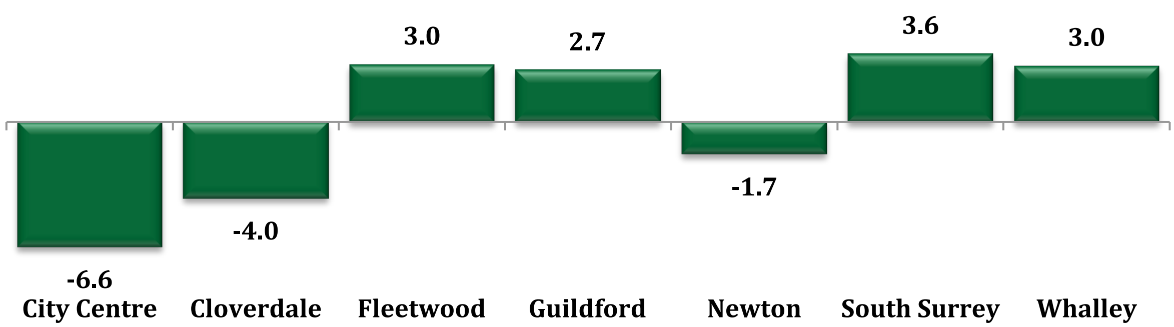

It should also be noted that a much greater proportion of collisions in which the civilian driver was deemed to be at fault for the crash (31%) than the member at fault collisions (17%) resulted in injuries. This may reflect the fact, as discussed above, that civilians tended to cause more serious collisions. Moreover, when members were at fault for the collision, only 5% of the time was a member injured and 11% of the time was a civilian injured. By comparison, and again suggesting that civilian at fault collisions were more serious, when the civilian was deemed responsible for the collision, 15% of the time a member was injured and 17% of the time a civilian was injured.

As noted in the methodology section of this report, there were notable problems with the manner in which injuries were identified. This difficulty also extended to the classification of injuries. Although 53 individuals were injured, the "Injury Classification" of 13 of these individuals (25%) was listed as "No Apparent Injury." Of the remaining 40 injuries, only one was categorized as "Severe", that is requiring on overnight stay at the hospital. All other injuries were classified as "Minor", such as abrasions, bruises, and lacerations in which the individual was immediately release from hospital or the scene of the collision). Although approximately 12% of collisions were characterized as severe in terms of the level of damage to the vehicle(s), these collisions rarely produced serious injury for those involved.[14]

In total, 20 of the 53 individuals injured in a collision (38%) were transported to the hospital. The majority of these transports went to Surrey Memorial Hospital. Of the 20 taken to the hospital, eight were members and ten were civilians. In the other two cases, the identity of the individual transported to the hospital was unclear based on the MV6020.

When considering the distribution of collisions and injuries throughout Surrey, it is important to consider the proportion of injuries in relation to the proportion of collisions. As demonstrated in Figure 32, City Centre produced 16.4% of all of the collisions in Surrey, but it recorded only 9.8% of all the injuries. This means that the proportion of injuries was 6.6 points below what was expected. South Surrey also recorded 9.8% of injuries, but it accounted for only 6.2% of collisions, thus producing a positive differential of 3.6 points. In other words, when considering the data presented in Figure 32, positive numbers indicate that a community experienced more injuries than would be expected given its share of collisions, while negative values suggest that the community saw fewer injuries than expected.

**FIGURE 32: PROPORTION OF INJURIES TO COLLISIONS BY COMMUNITY**

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[14] Of note, there were only two collisions that resulted in a member being injured in which the only vehicle involved in the collision was a police motor vehicle. All other collisions that resulted in member injury involved at least two vehicles.

While the focus of this report has been the role and nature of Surrey RCMP members in police motor vehicle collisions, it is important to note that members were deemed to be at fault for the collision in just over half (52%) of all collisions. Moreover, collisions for which civilians were found to be responsible were, on average, much more serious, in terms of vehicle damage. This does not minimize the dangers posed by police-involved collisions, but it does argue for a balanced response. The City of Surrey does not appear to have a disproportionate problem with police-involved motor vehicle collisions. The number of collisions is not out of line with what would be expected in a detachment the size of Surrey. Nor has there been an appreciable change in the number of police-involved motor vehicle collisions, as their number has been relatively stable over the three years covered by this report. In addition, police collisions do not appear to be a problem in any particular community within Surrey. Although one-third of collisions were recorded in Newton, this may reflect the distribution of police resources across the different communities.

Consistent with other studies (see Cohen et al., 2009), the majority of police-involved motor vehicle collisions in Surrey (65%) occurred in non-emergency situations. Not surprisingly, then, excessive speed or driving too fast for road conditions was not a significant factor leading to police motor vehicle collisions. For members, the one contributing factor that stood out was *driver inattention* (noted in 15% of cases). Otherwise, a wide variety of contributing factors were noted. Apart from driving inattention, the only factor that was present in more than 5% of cases was *following too closely*. *Failing to yield the right of way*, the third most common contributing factor, was found in only 4.2% of police motor vehicle collisions. Some causal factors that have featured more prominently in other studies, such as driver fatigue, were not evidenced in this data. In fact, there were no cases where driver fatigue was identified as a contributing factor.

With regard to MV6020 collisions, of the 74 for which the police were at fault and for which the primary collision code was known, a total of 33 or 45% involved rear-end collisions. Of these, 16 occurred when the member was slowing down for stopped traffic. A further 14 collisions were caused by a member backing up, with eight of those taking place in parking lots. Another 13 collisions occurred at intersections. Taken together, these three scenarios account for 81% of all police motor vehicle collisions in which the member was deemed to be responsible for the collision.

The issue of driver inattention seemed particularly prevalent in relation to less serious accidents. The non-MV6020 data did not formally include data on fault or contributing factors. However, it was possible to gain insight from brief narrative accounts of the collisions. Descriptions such as "PC backed into civilian vehicle" or "PC struck cement barricade" were taken to indicate situations where the member was responsible for the accident. By these criteria, members were involved in 84 non-MV6020 at-fault collisions. Put another way, members were responsible for a greater number of less serious (non-MV6020) than more serious (MV6020) collisions. This is noteworthy because the nature of the non-MV6020 collisions strongly suggests a degree of inattentiveness. For example, 35 such collisions (42%) took place in parking lots; 21 of these occurred while members where either driving their vehicles in reverse or in the process of parking.

One of the very positive aspects of this research was the finding that members seem to be regularly using safety equipment while driving. For MV6020 collisions, less than 7% of members were found not to using safety restraints. The proper use of safety equipment may in part account for the relatively low rate of injury, especially serious injury, shown in this report. Seat belts continue to be important factors in mitigating risk, as over one-quarter of collisions without restraints (26%) resulted in injury.

## Recommendations

Given the analyses and the literature review undertaken for this report, there are a number of steps that the Surrey RCMP can undertake to reduce the number of police involved motor vehicle collisions.

### RECOMMENDATION 1: FOCUS ON DRIVER INATTENTION

As discussed above, based on the data used for this report, there are a number of scenarios or conditions that contributed to police motor vehicle collisions when the member was deemed responsible for the collision that suggest a degree of driver inattention. First, the majority of police motor vehicle collisions did not occur when the member was operating a vehicle in an emergency mode, such as with lights or sirens on. Second, with regard to MV6020 accidents, nearly half involved rear-end collisions, most commonly when a member was approaching stopped traffic. This was followed by collisions occurring when a member was backing up their vehicle, particularly in parking lots. Intersection collisions were the third most common situation in which a member was responsible for a motor vehicle collision. These three scenarios accounted for four-fifths of all member-at-fault police motor vehicle collisions. Third, the issue of driver inattention seemed particularly prevalent in relation to less serious accidents. As mentioned above, the non-MV6020 data indicates that nearly half (42%) of the member-at-fault, less serious collisions took place in parking lots, most of which occurred while the member was either reversing their vehicle or in the process of parking. Given this, perhaps it should be made mandatory that members always back into a parking spot. Moreover, if members paid particular attention to their driving in these contexts, the reduction in collisions, specifically among those in which a RCMP member was responsible, could be substantial.

### RECOMMENDATION 2: PROVIDE SUPPLEMENTARY DRIVING COURSES FOR MEMBERS

As noted earlier, a commonly offered recommendation for reducing police-involved motor vehicle collisions is more or better police training. In light of the findings presented in this report, there is little evidence to suggest that insufficient or inappropriate training is at fault or should be a primary consideration for the detachment. Although the data collected for this report did not allow for an assessment of the amount of time between a member last participating in a driving course and being at fault for a motor vehicle collision, given the mean age of the members who were involved in a collision, it is likely that most members are years removed from any driving assessment or skill upgrade. Given the amount of time that members spend driving their vehicles, the detachment may consider ensuring that all members are qualified to drive their vehicles under that types of conditions typical for that member, similar to ensuring that all members are qualified on their firearms.

### RECOMMENDATION 3: INCREASE COMMUNICATION ABOUT POLICE MOTOR VEHICLE COLLISIONS

The results of this study suggest that members do not always fully appreciate the workaday hazards of driving. Given this, the detachment should consider implementing initiatives aimed at increasing this awareness. For example, to the extent that factors, such as driver inattention, contribute to collisions, it would be very useful to circulate information to members to make them more aware of the circumstances under which they tend to be inattentive drivers and the risk this poses to contributing to collisions. In effect, the detachment should encourage and support members to heighten their vigilance in these circumstances. However, given the "run-of-the-mill" nature of this information, it should not be limited to a one-off training session. Rather, it might be more effective to provide all members with reminders through regular email and briefing sessions as a means of increasing risk awareness and mental preparedness and for the detachment to introduce a point system or some other mechanism to ensure that members pay more attention while driving. In addition, it is important to educate members and have them think about and discuss, in the context of collisions, what could happen, what is the worst that could happen, how likely is this to occur, how members can prevent collisions, what they can do to make collisions less likely to occur, and what to do if a collision does occur as a way of promoting important knowledge and encouraging practical and realistic evaluations of risk.

### RECOMMENDATION 4: IDENTIFY AND ADDRESS MEMBERS AT GREATER RISK FOR MOTOR VEHICLE COLLISIONS

By their very nature, most collisions are accidental. A majority of members will experience them during their careers, and some members will experience more than one in their career. Consequently, efforts at reducing collisions are most fruitfully conceived to be collective. However, just as with the general public, there may be some members who are more prone to be in collisions. For this subpopulation of members, more direct remedial measures may be required. The data used for this report did not include information on individual members, so there was no way to determine whether there were members with demonstrably worse driving records than others. However, previous research with RCMP data suggested that there are a small number of members who are responsible for several collisions. Given this, Surrey Detachment should undertake a project to identify whether there are members chronically involved in collisions, the circumstances under which their collisions are occurring, and what steps can be taken to assist these members to avoid future police motor vehicle collisions.

### RECOMMENDATION 5: DATA COLLECTION

As demonstrated in Appendix A, there was a considerable amount of missing data. This was particularly problematic when the data in question was central to understanding the nature and cause of the collision, such as the primary collisions code. It is widely understood that RCMP members are required to do considerable amounts of paperwork; however, in order to properly monitor and respond to police motor vehicle collisions, it is necessary that forms, such as the MV6020, are filled out as accurately and completely as possible. As the MV6020 form is required by

ICBC, perhaps it is possible for the police to work with ICBC to modify the form so that it meets the requirements of ICBC, while still ensuring that all members can collect and record accurate and meaningful data in a short period of time. One suggestion might be to highlight or re-order the most common types of collisions so that it is easier for members to quickly check off this vital piece of information. It might similarly be possible to highlight the most important information on the form that members should always complete. For example, it is imperative that the *collision address* and *primary collision code* be filled out for each collision. In relation to vehicles, vital information would include the fields related to *damage* and *severity*. Finally, much greater attention needs to be paid to the *All Involved* section of the MV6020, particularly the fields concerning injury.

Finally, it is possible that MV6020 reporting would be more complete if the form were more streamlined. Specifically, several of the response fields, such as *Vehicle Type* and *Pedestrian Action*, have too many categories and are too unwieldy. Trying to work through all of these options likely adds to the time it takes for members to complete the forms and promotes missing data or mistakes. This is more notable in relation to *Contributing Factors*. Too many options are listed, and they are not listed in any particular order to make it easier on members to accurately fill them out. Based on the results presented in this report, it would be more efficient to focus on fewer factors, and to list them according to how often they tend to be cited. In turn, this increased efficiency would hopefully encourage members to fill out the forms with greater precision. It would also be beneficial if there were a place on the form for members to identify who has primarily responsible for the collision.

# Appendix A: Missing Data – MV6020 Forms

| Variable | N Missing | % |
|---|---|---|
| *Collision Data [N=189]* | | |
| Date | 0 | 0.0 |
| Police Zone | 62 | 32.8 |
| Community | 12 | 6.3 |
| Fault | 0 | 0.0 |
| Primary Collision Code | 53 | 28.0 |
| Location | 6 | 3.2 |
| | | |
| *Vehicle Data [N=377]* | | |
| Police or Civilian | 4 | 1.1 |
| Type of Vehicle | 21 | 5.6 |
| Severity Level | 24* | 6.4 |
| Damage ($) | 37 | 9.8 |
| | | |
| *Individual Involved Data [N=455]* | | |
| Ages | 72 | 15.8 |
| Sex | 13 | 2.9 |
| Use of safety equipment | 49 | 10.8 |
| | | |
| Type of injury [N=53] | 7 | 13.2 |
| Taken to hospital [N=20] | 2 | 10.0 |

*** By using supplemental information, the number of missing cases was reduced to 6 (1.2%)**

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