TARGET RACE AND SHOOTING PERFORMANCE

**THE INFLUENCE OF TARGET RACE ON SPLIT-SECOND SHOOTING
DECISIONS IN SIMULATED SCENARIOS: A CANADIAN PERSPECTIVE**

A thesis submitted to
the Faculty of Graduate and Postdoctoral Affairs
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Doctorate of Philosophy

by

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Abstract

Research in the U.S. has indicated that community members often show a negative Black bias when deciding to “shoot” Black versus White targets in simulated shooting tasks, but police officers often fail to show this bias. Three studies were conducted using a shooting task similar to the task used in previous research to examine whether this Black bias was present in the shoot/don’t shoot decisions of Canadian participants. In addition, factors that were likely to increase or decrease the degree of racial bias in such decisions were examined. Study 1 ($n = 146$) found that samples of students, police recruits, and police officers displayed a White bias rather than a Black bias in their shoot/don’t shoot decisions. Study 1b ($n = 74$) indicated that this finding was not attributable to the specific instructions provided to participants before they made their shoot/don’t shoot decisions, which differed slightly from previous research, in that the purpose of the research was more salient. Study 2 ($n = 130$) introduced scenes that varied by complexity to students, police recruits, and police officers. As expected, and consistent with Study 1, this study demonstrated that a White bias existed in the shooting decisions of participants and that this bias was exacerbated under conditions of high complexity. Finally, Study 3 ($n = 120$) demonstrated that student participants exhibited a White shooting bias even when attempts were made to reduce the bias using an implementation intention training technique, which has been shown to reduce racial biases in previous studies. The theoretical and practical implications of this research are discussed, focusing primarily on potential reasons for the White shooting bias and what the bias might mean for use of force training. Directions for future research are also suggested.

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CHAPTER 1

The Influence of Target Race on Split-Second Shooting Decisions in Simulated Scenarios: A Canadian Perspective

Introduction

On the night of February 4, 1999, New York City police officers were tracking a rapist when they came upon Amadou Diallo, a 22 year old West African immigrant. Diallo matched the description of the suspect, and when challenged by the police, he ran. When police ordered Diallo not to move, he reached into his pocket and pulled something out. Believing the object to be a gun, one of the officers fired his weapon, instinctively stepped back, and fell with his arms raised over his head (Weiss, 1999). Thinking that their partner was shot by Diallo, the remaining officers opened fire, shooting a total of 41 shots, 19 of which hit Diallo and caused his death. Ultimately it was discovered that the object Diallo pulled out of his pocket was not a gun, but rather his wallet (Aveni, 2003).

Several years later, on the night of March 15, 2003, 25-year old Marquis Hudspeth was being pursued by Shreveport, Louisiana police officers because he was believed to be driving under the influence of alcohol. After a five-mile high speed pursuit, he was cornered by the police. Standing outside of his vehicle Hudspeth turned to police officers at the scene and pointed a metallic silver object at one of the officers. Believing the object to be a gun, the officers fired, and Hudspeth was killed. However, as in the unfortunate case of Diallo, it was later determined that the object being held by Hudspeth was not a gun, but rather a silver cell phone (Aveni, 2003).

While these types of tragedies are not common, police officers do sometimes make shooting errors (Mitchell & Flin, 2007). When such errors happen, questions are

obviously raised as to why these incidents occurred. Inevitably, in cases like the ones previously cited, the answers to these questions tend to focus on the fact that the individuals who were killed were Black (Sharps, 2010).¹ The evidence used to support such answers often relies on the perceived racial biases that are thought to exist in many modern police agencies, especially in North America (e.g., Petrocelli, Piquero, & Smith, 2003; Weitzer & Tuch, 2005; Wortley & Tanner, 2003). Social scientists who are interested in this issue also turn to the long record of social psychological research to support such answers; research that demonstrates that ambiguous actions (e.g., pulling an object out of one's pocket) are often interpreted very differently depending on the race of the individual being observed.

For instance, social psychological studies have shown that when individuals are asked to judge the same behaviours exhibited by Black and White targets, they often rate Black targets as being more aggressive than White targets (Duncan, 1976; Johnson, Trawalter, & Dovidio, 2000; Sagar & Schofield, 1980). One possible reason for these differences may be a racial stereotype that some people possess (e.g., that Black people are more aggressive than White people). In support of this view, social psychologists have for many years documented a strong and prevalent negative stereotype of Black individuals as being aggressive, dangerous, hostile, criminal, and so on (Allport, 1954; Devine, 1989; Payne, 2001).

Because stereotypes can act as powerful heuristics when an individual is observing the behaviour of targets, it is possible that the stereotypic link between Black

¹ It is important to point out that there are examples where police officers have mistaken innocuous objects for firearms, even when the suspect was not Black. For instance, Berry Millsap in Tacoma, Washington was shot and killed when he pointed a small black cordless drill at police (Seattle Times, 2007). Also, Jason Steacy in Renfrew, Ontario, turned towards police officers with a black computer mouse in his hand and was shot and killed (Ottawa Citizen, 2007).

individuals and aggressive (dangerous, hostile, criminal, etc.) behaviour becomes activated. Once activated, this stereotype may influence subsequent judgments about the person being observed and determine how we behave towards them (Bargh, 1999). One type of behaviour that has received a lot of attention recently (due primarily to cases like the Diallo and Hudspeth shootings) is the decision to shoot armed and unarmed targets who vary by race (Correll, Park, Judd, & Wittenbrink, 2002; Correll et al., 2007a; Plant & Peruche, 2005; Plant, Peruche, & Butz, 2005; Watt, 2010).

This research, which has been conducted primarily in the U.S., has clearly shown that when community members/students are forced to make shoot/don't shoot decisions in race-based simulated shooting scenarios, they frequently make errors, especially on stereotype-incongruent trials (e.g., shooting unarmed Black targets and not shooting armed White targets; e.g., Correll et al., 2002; Plant et al., 2005; Watt, 2010).

Interestingly, despite the robustness of this finding across community/student samples, this Black shooting bias is not consistently found with American police professionals. For example, while Plant and Peruche (2005) found a Black racial bias amongst police officers, Correll et al. (2007a) did not find strong evidence of biased shooting outcomes in their police officers sample.

These findings raise a number of interesting questions, many of which will be explored in the current dissertation. For example, why is it that police officers are sometimes able to perform better on race-based shooting tasks than community members/students? Is it that police officers do not possess the same negative stereotypes of Black individuals and thus, these stereotypes are not triggered when encountering targets in shooting scenarios? Or is it the case that police officers possess such

stereotypes, but are better able to control their behavioural responses to these stereotypes (i.e., decide not to shoot if a weapon is absent)? If this type of controlled processing is an important aspect of non-biased shooting, are there factors that influence the degree to which controlled processing can be used by participants? If there are, do these factors operate in a similar way across participants that vary with respect to police experience? Similarly, are there factors that consistently influence the degree to which racial stereotypes become activated when encountering potentially dangerous targets? Finally, do answers to these questions differ depending on where the study is conducted? For example, will Canadians show less (or more) racial bias in their shoot/don't shoot decisions than their American counterparts?

To examine these issues, three studies that draw on Canadian samples will be conducted. Each study is based loosely on Correll et al.'s (2002, 2007a) shooting task, whereby participants are asked to make shoot/don't shoot decisions when presented with armed or unarmed Black or White targets in simulated shooting scenarios delivered via desktop computer. Study 1 will investigate whether racial biases can be observed amongst Canadian participants in the shooting task and whether the degree of racial bias observed is influenced by the participants' level of police experience. Study 2 will build upon this study by manipulating the complexity of the scenes encountered by participants who vary by police experience. Specifically, this study will determine if complex scenes decrease one's ability to conduct controlled processing, as one might expect, thus increasing the degree of racial bias that is observed amongst participants. Finally, Study 3 will examine whether it is possible to reduce any racial biases that emerge in Study 1 and

2 by using a technique – implementation intentions – that have proved useful for reducing racial biases in previous studies.

Before proceeding with a more detailed description of these studies, a literature review is provided. This review is divided into six sections. First, a brief overview of the general stereotype literature is presented, which focuses primarily on definitional issues. Second, literature examining the prevalence of Black racial stereotypes will be examined, including research from both the U.S. and Canada. Third, a review of studies will be provided, which demonstrates how target race has influenced shooting behaviour in previous research. Fourth, the role of automatic and controlled processing in stereotype-driven behaviour will be discussed; including a description of how these processes can be measured using signal detection analysis. Fifth, a review of factors that might influence how stereotypes impact shooting behaviour will be presented. Finally, a variety of training strategies that may decrease racially-biased shooting behaviour will be briefly evaluated.

General Stereotype Research

What are Stereotypes?

Most social scientists agree that Lippman (1922) was the first to introduce the term “stereotype”. He stated that stereotypes are “an ordered, more or less consistent picture of the world, to which our habits, our tastes, our capacities, our comforts and our hopes have adjusted themselves” (Lippman, 1922, p. 73). While the term “stereotype” can now mean many different things to different people, within psychology one of the most accepted views is that stereotypes are beliefs (i.e., any piece of semantic knowledge) about the characteristics, attributes, and/or behaviours of members of certain

social groups (Hilton & von Hippel, 1996; Schaller, Conway, & Peavy, 2010).

Importantly, while often considered as such, stereotypes do not necessarily have to be negative, although they tend to be negative when referring to members of out-groups, or those with which we have few encounters (Cacioppo, Marshall-Goodell, Tassinari, & Petty, 1992; Hilton & von Hippel, 1996).

One reason why stereotypes have received so much attention from social scientists is because they can lead to negative outcomes when they are applied to group members (Hilton & von Hippel, 1996). Unlike stereotypes, which are simply *beliefs* about certain people, prejudice is usually defined as the actual *application* of these stereotypes (Dovidio, Kawakami, Smoak, & Gaertner, 2009). Prejudicial responses can take many different forms. For example, prejudice can be rather blatant and displayed as outright or overt discrimination (e.g., as racially biased shooting decisions), or it can be expressed in more subtle, indirect, or covert ways (e.g., policies which have a differential impact on people of different races) (Dovidio et al., 2009). Either way, the potential for harm is great when stereotypes manifest themselves in the form of prejudice, and therefore it is important to understand prejudice and how it operates in particular contexts. To accomplish this, it is necessary to first understand how and why stereotypes develop.

Where do Stereotypes Come From?

There are numerous schools of thought about how stereotypes develop (Dovidio et al., 2010). The three perspectives focused on here include the evolutionary, developmental, and cognitive perspective.

In general terms, evolutionary psychology assumes that if a specific psychological tendency (e.g., attention biases, cognitive shortcuts, or social stereotypes) promotes reproductive fitness, then it will become increasingly widespread within a population (Schaller et al., 2010). According to the evolutionary perspective then, stereotypes might develop because they are beneficial to humans; a species who exist interdependently with others and must therefore protect itself from the risks associated with this type of lifestyle (e.g., exploitation by others, insufficient resources, etc.) (Brewer & Caporael, 2006). Stereotypes that contribute to the formation of social boundaries presumably help to enhance the reproductive fitness of individuals, and the groups to which these individuals belong, because they act as fundamental distinctions between coalition groups (Brewer, 1999). In support of this line of thinking, research has demonstrated that members of an in-group are more likely to exhibit prejudicial responses to out-group members, especially when they are made to feel more vulnerable (e.g., when their safety, health, or resources are threatened; Schaller, Park, & Mueller, 2003).

In contrast to the evolutionary perspective, the developmental perspective places primary importance on the social experience and the role of context when explaining the development of stereotypes. According to this perspective, humans have the propensity to stereotype, prejudice, and discriminate, but also the capacity to uphold equality, justice, and fairness. What ultimately occurs for a specific individual (whether they develop specific stereotypes or not) largely depends on the developmental history of that individual (Killen, Richardson, & Clark-Kelly, 2010). For example, in a study examining the role that environmental factors play in the formation of racial stereotypes, McGlothlin and Killen (2006) asked children to evaluate potential ambiguous moral transgressions

(e.g., pushing, stealing money) while they manipulated the race of the transgressor (to be Black or White). The results of this study showed that while children enrolled in racially heterogeneous schools did not display a racial bias, White children enrolled in racially homogeneous schools displayed an in-group bias. Thus, the presence of a racial bias in this study depended on the social experiences of the children, rather than some innate tendency to be biased towards out-group members (as might be hypothesized by a person taking an evolutionary perspective, or even a cognitive perspective, as discussed below).

Finally, the cognitive perspective, first presented by Allport (1954) in *The Nature of Prejudice*, views the emergence of stereotypes as a normal part of cognition. In short, this perspective argues that the world is full of stimuli that require cognitive processing, and given the basic cognitive limitations that humans experience (e.g., a limited working memory; Baddeley, 1986) there needs to be a way to simplify or reduce the amount of information that requires processing. One way to accomplish this is through the activation and implementation of categorical thinking, which is consistent with the use of stereotypes (Macrae & Bodenhausen, 2000). Categorical thinking saves people from having to process each unique trait or attribute that they might be exposed to when encountering an individual (Macrae, Milne, & Bodenhausen, 1994). Instead, the individual can be placed into a social category, which allows for inferences to be made about the person's traits or attributes even if these traits or attributes have not been observed. In support of this perspective, research has clearly shown that people display a tendency to form generalizations about groups that minimize within-group differences and exaggerate between-group differences, which can lead to the persistence of stereotypes from a cognitive perspective (Fiske & Russell, 2010).

When do People Act on Stereotypes?

Often, stereotypes can be activated the second that one is exposed to a target group or group member (e.g., an individual of a particular sex, race, age, etc.; Fiske, 1998). Once activated, these stereotypes may automatically influence judgments and change behaviour, outside of one's conscious awareness and beyond one's ability to control (Bargh, 1999). However, exposure to a target group (or group member) does not necessarily mean that one's stereotypes will be activated or that they will be acted on (Bargh, 1999; Gilbert & Hixon, 1991; Macrae, Bodenhausen, Milne, & Calvini, 1999). Indeed, whether this happens depends on a complex interplay of motivational and cognitive factors (Macrae & Bodenhausen, 2000).

Despite the fact that most individuals are aware of the same cultural stereotypes (e.g., that Black people are often assumed to be more aggressive than White people), some people are motivated for various reasons (i.e., social pressure, egalitarian views, etc.) to inhibit these stereotypes and/or not act upon them (Hilton & von Hippel, 1996; Lepore & Brown, 1997). For example, it appears that some people attempt to override the automatic effects of category activation (i.e., this person is Black so they must be aggressive) by replacing culturally-based stereotypic thoughts with their own non-prejudiced personal beliefs through controlled cognitive processing (i.e., this Black person is not doing anything that appears to be aggressive; Devine, 1989). This type of controlled processing tends to lead to a higher level of accuracy with respect to categorization (i.e., is this person likely to be aggressive or not) because it is more systematic and individualized (Chen, Schechter, & Chaiken, 1996). If sufficiently motivated, research indicates that people can in fact inhibit the activation of stereotypes

and the likelihood that stereotypes will be acted on when activated (Devine, 1989; Moskowitz, Salomon, & Taylor, 2000; Sinclair & Kunda, 1999). However, motivation to avoid prejudiced reactions may not always be sufficient; an individual also requires the cognitive resources necessary for inhibition to occur (Gilbert & Hixon, 1991; Kunda & Spencer, 2003)

Inhibiting the activation or application of a stereotype may take considerable effort. Thus, when an individual suffers from deficits in cognitive capacity they may apply stereotypes that they would otherwise suppress (Devine, 1989; Kunda & Spencer, 2003; Olson & Fazio, 2009). In other words, despite a desire to inhibit the activation or application of stereotypes, they may still have an effect on judgment and behaviour when an individual is unable to rely on a controlled processing approach. For example, one study asked alert or fatigued participants to judge a criminal case, in which the defendant either did or did not belong to a stereotyped group. Alert participants did not apply the stereotype and judged the defendant as less guilty compared to the fatigued, cognitively-impaired participants (Bodenhausen, 1990). Judgments have also been found to become more stereotypical under conditions of heightened cognitive load (e.g., Gilbert & Hixon, 1991) and increased time pressure (e.g., Jamieson & Zanna, 1989).

Stereotypes of Black Individuals

One group in particular – Black individuals – has received a lot of attention from social scientists over the last 60 years. Research conducted in the U.S. has shown that Black individuals are often associated with a negative racial stereotype, which sees them as more aggressive, dangerous, and criminal than White individuals (Allport, 1954; Devine & Elliot, 1995; Duncan, 1976; Payne, 2001). One common procedure used to

examine Black stereotypes is to ask participants to rate the degree to which certain traits are consistent with the stereotype of Black individuals. When Krueger (1996) did this, the trait with the highest level of agreement across participants was *aggressiveness*. In addition, the highest mean ratings for traits representing Black individuals were for *athletic*, *aggressive*, and *prone to violence*. Similarly, Blair, Judd, Sadler, and Jenkins (2002) investigated the role that physical features play in the stereotypes of Black individuals. Their results showed an association between the degree of Black features a person displays (e.g., dark skin tone, hair texture, etc.) and ratings of negative stereotypic attributes (e.g., hostile, criminal record, etc.). Still other research has found a bidirectional relationship between Black individuals and crime, such that Black faces trigger thoughts of crime and thinking of crime triggers thoughts of Black people (Eberhardt, Goff, Purdie, & Davies, 2004).

An extensive literature search revealed a lack of published social psychological literature that focuses on the prevalence of negative Black stereotypes in Canada. Interestingly, the only study that could be located opposes the seemingly consistent negative Black stereotype found in the U.S. As part of a pilot study, Clow and Esses (2007) gave Canadian participants ($n = 102$) an open-ended questionnaire and asked them to list characteristics that they thought described different social groups (e.g., Black, Native, homosexual, etc.). Results showed that not a single participant in this study described Black individuals with terms related to violence or crime. Moreover, this finding did not appear to be the result of socially desirable responding, as a number of participants did mention negative traits (e.g., angry, alcoholic, etc.) when asked to

describe Natives. This study raises the possibility that the negative Black stereotype that appears to permeate the U.S. may not exist in Canada, at least not to the same extent.

Sources of the Black Stereotype

Research has demonstrated that there are numerous reasons why people generally possess negative stereotypes of Black people (at least in the U.S.). One reason, which is frequently cited in the literature, is the way in which the media endorses the association between Black individuals and crime (Gilliam, Iyengar, Simon, & Wright, 1996). For instance, several studies have found that, compared to official crime statistics, Black individuals are over-represented as suspects of crime in local news media and under-represented as victims (Dixon, 2008; Gilliam et al., 1996; Holt, 2010).

In addition, the way in which Black suspects are presented in media portrayals is different from the way in which White suspects are presented. For example, Entman (1992) found that Black suspects are more likely to remain unnamed in media accounts of crime, seen in handcuffs, and in physical custody compared to White suspects. Arguably, this depiction of Black people may result in viewers perceiving them as more physically threatening than White people (Jamieson, 1992; Welch, 2007). These images also suggest to viewers that, in general, Black suspects may be involved in more violent crimes. As Hacker (1995) notes, “‘Black crime’ does not make people think about tax evasion or embezzling from brokerage firms. Rather, the offenses generally associated with Blacks are those...involving violence” (p. 188). There does not seem to be a noteworthy difference between the portrayal of Black individuals in Canada compared to the U.S. (Manzo & Bailey, 2005). One possibility for this is because much of the media that is broadcast in Canada is actually American.

In addition to news media, pop-culture also tends to encourage the stereotypic association between Black individuals and aggression, hostility, danger, crime, etc. (Correll et al., 2002). For example, Rudman and Lee (2002) point out that the media gives a great amount of attention to Black rappers who are often singing about misogynous and violent themes. They conducted an experiment showing that, when compared to participants who had heard non-rap music, participants who were primed with rap music rated Black targets as having more negative attributes (e.g., hostile, criminal, etc.) than positive attributes (e.g., calm, trustworthy, etc.).

Another potential source of negative racial stereotypes, particularly as they relate to crime, is official crime reports, which arguably show that Black individuals (at least in North America) commit a disproportionate amount of crime. For example, American statistics report that while Black individuals represented approximately 12% of the population in 1997, they accounted for more than half of all arrests for robbery and murder, and just under half of all inmates in state and federal correlational facilities (Hurwitz & Peffley, 1997). While Canadian statistics on race and crime are less accessible, one set of data from 1996 shows that while Black individuals account for only 2% of the Canadian population, they represent over 6% of those in federal correctional institutions (Wortley, 1999). While clearly not as severe as the situation in the U.S., the degree of over-representation observed in Canada might contribute to a general *perception* that Black individuals commit more crime (and are more aggressive, dangerous, hostile, etc.) than White individuals.²

² Of course it must be said that other potential explanations exist for the over-representation of Blacks within the North American criminal justice system, beyond what is discussed here. For example, as highlighted by LaPrairie (2002) in her discussion of the Aboriginal over-representation problem in Canada, alternative explanations could include: (1) Blacks commit the same number of crimes as Whites, but they

Influence of Black Racial Stereotypes

The negative consequences associated with Black racial stereotypes have been demonstrated across numerous studies in the U.S. where different outcome variables have been measured. To name just a few of the potential consequences, negative racial stereotypes towards Blacks have been shown to significantly influence the verdicts of mock juries, the evaluation of ambiguous behaviour, and one's ability to correctly distinguish weapons and non-weapons.

For example, in one study mock jury members read one of two trial summaries of an inter-racial battery case. The details of the case were identical, except that in one version the defendant was White and the victim was Black, whereas in the other the defendant was Black and the victim was White (Sommers & Ellsworth, 2001). Results showed that those who received the story of the Black defendant (and White victim) judged the defendant more harshly, judged the prosecution's case as stronger, and were more confident in their decision compared to those with the White defendant (and Black victim). Two meta-analyses that have since examined racial bias in mock juror decision making have found consistent results (e.g., Mitchell, Haw, Pfeifer, & Meissner, 2005; Sweeney & Haney, 1992).

In addition, studies have consistently found that the same behaviours acted out by Black and White individuals are perceived very differently by observers, with Black individuals often being perceived as more aggressive than White individuals (Hurwitz & Peffley, 1997; Johnson, Adams, Hall, & Ashburn, 1997). For instance, in Duncan's

commit more serious crimes (e.g., violent interpersonal crimes) that are more likely to receive serious sanctions (e.g., prison sentences), (2) there are criminal justice policies in place (e.g., imprisoning offenders who default on fine payments) that have a differential impact on offenders of different races due to their socio-economic status, or (3) the criminal justice system is racist, either in an overt way or in a covert, more systemic way.

(1976) classic study, participants were shown a videotaped altercation between two male actors. The actors' race was manipulated and results showed that White observers labeled shoves by the Black actor as more aggressive than shoves by the White actor. This suggests that participants had a lower threshold for labeling an act as violent for a Black, as compared to a White, individual. This finding has since been replicated (e.g., Johnson, Trawalter, & Dovidio, 2000; Miller, Maner, & Becker, 2010) and, importantly, the finding does not appear to depend on the race of the observer (Correll et al., 2002, Study 4; Sagar & Schofield, 1980).

Finally, studies have shown that peoples' ability to correctly distinguish weapons and non-weapons can be influenced by whether or not they are primed by a Black versus a White face. For example, Payne (2001) asked participants to make visual discriminations between a gun and a tool in a computerized task. The face of a Black or White individual was flashed on the screen followed by the image of a gun or a tool and then a visual mask. Results showed that participants incorrectly claimed they saw a gun more often when primed by a Black face. Participants were also able to correctly detect guns faster in this condition. Other studies have reported similar results (e.g., Amodio et al., 2004; Payne, Lambert, & Jacoby, 2002).

It seems clear based on these studies conducted in the U.S., that the stereotype linking Black individuals to aggression (or aggressive acts) can have an important impact on a variety of tasks and outcomes. Interestingly, similar research conducted in Canada provides a far less convincing picture. This is not to say that there is no research conducted in Canada, which shows that negative Black stereotypes might impact Black individuals in a meaningful way. For example, Schuller, Kazoleas, and Kawakami (2009)

demonstrated an anti-black bias in mock jurors' judgments (e.g., of guilt) of Black defendants compared to White defendants. However, this research seems to be the exception rather than the rule in Canada.

Indeed, the majority of Canadian research examining this issue has indicated that the Black-White race dichotomy has little impact on outcomes. For instance, Maeder and Saliba (2011) examined the influence of defendant race on juror decision making and their results showed no significant Black bias on participants' perceptions of guilt. Similarly, Lant, Clow, and Cutler (2011) recently examined the effect of race on perceptions of defendant culpability in pretrial publicity. Again, their results revealed no significant bias towards Black defendants. In fact, some Canadian research has even uncovered what some people have called an "overcorrection effect" of racial bias in mock trials, whereby participants' verdicts and case judgments are actually more favourable for Black, compared to White, defendants (e.g., Bagby, Parker, Rector, & Kalembo, 1994; Fitzgerald, Crewe, & Schuller, 2011).

This is all to say that compared to research conducted in the U.S., Canadian studies show less consistent results regarding the impact of Black racial stereotypes on behavioural outcomes. That being said, the bulk of social psychological literature across cultures does show the potential for racial stereotypes (particular Black stereotypes) to influence one's judgments, perceptions, and evaluations of behaviour. Relatively recently, researchers have begun to examine the connection between these racial stereotypes and one specific type of behaviour – split-second shooting behaviour (e.g., Correll et al., 2002; Plant & Peruche, 2005; Plant et al., 2005; Unkelbach, Forgas, & Denson, 2008; Watt, 2010). A review of these studies will be provided next.

Racial Stereotypes and Shooting Behaviour

As indicated above, several studies have been conducted to examine the role of target race on shooting decisions, many of which have tested non-police professionals. The first of these was conducted by Correll et al. (2002). Correll and his colleagues presented community members and students with a task where a Black or White target, flashed quickly on a computer screen, was holding either a threatening object (e.g., gun) or a non-threatening object (e.g., wallet). Despite instructions to shoot armed targets, but not unarmed targets, the target's race had an influence on the participants' performance. Results revealed that on trials where the target was armed, participants were significantly more likely to shoot the target when he was Black. In addition, on trials where the target was unarmed, participants were more likely to shoot Black targets, although this finding was not significant.

Interestingly, the impact of target race on performance in Correll et al.'s (2002) study was not only found with decision outcomes (i.e., shoot/don't shoot), but also with response times. Specifically, results revealed a significant object by race interaction, whereby participants were slower to respond on stereotype-incongruent trials (i.e., unarmed Black targets and armed White targets) than stereotype-congruent trials (i.e., armed Black targets and unarmed White targets). This was found to be especially true for participants who believed that a strong cultural stereotype exists around Black individuals as being more aggressive, violent, and dangerous.

More recently, Plant et al. (2005) conducted a similar study using slightly less realistic stimuli. Student participants were shown either a Black or White face. Following this, either a gun or neutral item was superimposed on the forehead of the target. The task

for participants was to accurately and quickly shoot the “armed” targets. Results from this study were consistent with those reported by Correll et al. (2002). Specifically, participants made significantly more errors on stereotype-incongruent trials (i.e., White-gun and Black-wallet) than the reverse. Unfortunately, Plant et al. (2005) did not assess participants’ stereotypic knowledge or beliefs, so it was not possible to examine the relationship between any other stereotype measures and shooting performance.

As indicated previously, results from similar studies where police professionals have been tested are less consistent. In some studies a clear racial bias is observed. For example, Plant and Peruche (2005) conducted an identical study to Plant et al. (2005), but used police officers as participants. The results were similar to their previous investigation of students, with the officers showing a clear racial bias in their shooting decisions. However, in other studies that have tested police professionals, little evidence for a racial bias emerges. For example, when Correll et al. (2007a) attempted to replicate the results of their original study with police officers, they found that compared to a community sample, police officers were significantly faster to make correct shooting decisions, better able to differentiate armed from unarmed targets, and slightly more balanced across races in terms of their criterion for when a target should be shot. The only variable where a clear racial bias was observed for police officers related to reaction times. Like community members, police officers in their study were significantly quicker to respond on stereotype-congruent trials (i.e., armed Black and unarmed White targets).

More recently, researchers have begun to examine the influence of other races on shooting decisions. For instance, the sort of shooting bias reported by Correll et al. (2002) and Plant et al. (2005) has now been found using male and female Muslim targets

wearing Islamic headgear (Unkelbach et al., 2008; Unkelbach, Schneider, Gode, & Senft, 2010). Researchers have also started examining how other factors interact with target race to influence shooting decisions. For example, Plant, Goplen and Kunstman (2011) recently examined the influence of gender *and* race on shooting performance, and found that while gender has an impact on shooting decisions (males are more likely to be shot compared to females; Study 1), the previously found race effects still hold true (Black men were most likely to be shot compared to all other groups; Study 2).

Relatively recently, this type of research has also started to be conducted in Canada. For example, in an unpublished study by Yoshida (2009), which relied on Correll et al.'s (2002) shooting scenarios, a Black bias in shooting performance was observed using student participants. Replicating Correll et al.'s previous results, a significant object by race interaction was found for reaction times, whereby participants were quicker to make correct decisions for armed Black targets compared to armed White targets, and for unarmed White targets compared to unarmed Black targets. However, when Yoshida examined error rates, there was no significant object by race interaction, although the findings were still in the direction of a Black shooting bias.

Taken together, studies conducted in the U.S. (and one in Canada) demonstrate that while there is a clear Black bias in shooting decisions for non-police professionals across a variety of conditions, this may not always be the case for police officers. This begs the question of why? To shed light on this question, and to gain a better understanding of what might be happening when individuals participate in simulated shooting tasks, it is necessary to explore the cognitive processes that contribute to one's performance in such tasks.

Automatic and Controlled Processes

In order to make correct shooting decisions in race-based simulated shooting tasks, it is necessary that participants ignore the target's race and base their decision on the object being held by the target. The shooting bias found in many previous studies indicates that this is not happening. This has led some to suggest that shoot/don't shoot decisions (in simulated shooting tasks at least) are influenced by: (1) the degree to which a target's race automatically triggers a racial stereotype and/or (2) the degree to which responses to an activated stereotype can be controlled by the participant (Mendoza, Gollwitzer, & Amodio, 2010; Plant et al., 2005). This section reviews relevant literature in order to understand the role of these automatic and controlled processes in shooting decisions.

The idea that decisions, like those in the shooting task, are potentially the result of two underlying processes - one automatic and the other controlled - is certainly not new. Indeed, similar *dual process theories* are commonplace in cognitive psychology and have been popular for some time (Shiffrin & Schneider, 1977).³ Essentially, automatic processes are those that operate outside of an individual's awareness. These processes begin without conscious intent, are triggered by an outside stimulus, and are generally considered efficient, in that they are quick and do not compete for attentional resources with other operations (Payne, 2001). Controlled processes, on the other hand, are

³ Other researchers agree with this distinction between automatic and controlled processes, although they use different labels for the processes (Hofmann Gawronski, Gschwendner, Le, & Schmitt, 2005). These labels have included: spontaneous versus deliberative (Fazio, 1990), hot versus cool (Metcalf & Jacobs, 1996), experiential versus rational (Pacini & Epstein, 1999), associative versus rule-based (Smith & DeCoster, 2000), impulsive versus reflective (Strack & Deutsch, 2004), and Gestalt versus feature-intensive (Sharps, 2010).

conscious, intentional, and are executed by a limited-capacity attentional system. As such, controlled processes are constrained by one's cognitive resources (Payne, 2001).

Since they became popular, dual-process theories that emphasize automatic and controlled processes have been applied to many cognitive and social psychological tasks (e.g., the Stroop task, Stroop 1935; errors in recognition memory, Jacoby, 1991; attitude change, Petty & Cacioppo, 1986; attitude-behaviour consistency, Fazio, 1990; etc.). Dual process theories have also been applied, more recently, to racial biases in weapon identification and simulated shooting tasks (e.g., Payne, 2001; Payne et al., 2002; Plant et al., 2005).

Recall that in the weapon identification task, participants are more likely to identify tools as guns after being primed with a Black (versus White) face, and they are faster to identify guns as guns when primed with a Black (versus White) face. Similarly within simulated shooting tasks, participants are more likely (and quicker) to shoot armed targets when the targets are Black (versus White) and more likely (and quicker) to not shoot unarmed targets when the targets are White (versus Black). In both of these tasks, the automatic component is assumed to reflect the degree to which participants' responses are biased by the target's race. The controlled component is assumed to reflect the degree to which participants are accurately categorizing the objects being presented to them (i.e., guns or neutral objects) and responding appropriately (i.e., deciding that a gun is a gun, or shooting only armed targets; Payne, 2001; Plant et al., 2005).

Examining these Processes using Signal Detection Analysis

A variety of procedures exist for trying to disentangle the role that automatic and controlled processes play in tasks like the shooting task (e.g., the process dissociation

procedure; PDP; Payne, 2001; the Quad Model, Sherman et al., 2008). However, one type of analysis commonly relied upon to explore these processes in the shooting task is signal detection analysis (Green & Swets, 1966). Signal detection analysis focuses on two separate issues: *sensitivity* (referred to as d' in signal detection terms), which relates to a person's ability to evaluate or scan information in order to distinguish between signals and noise, and *criterion* (referred to as c in signal detection terms), which relates to a person's tendency to either be conservative or liberal when deciding whether a signal is in fact present (a conservative person requires more evidence before deciding that a signal is present) (Swets, 1973).

In the shooting task, signal and noise refer to whether the target is armed (signal) or unarmed (noise). It is assumed that the different types of targets (armed versus unarmed) will vary along some judgment-relevant dimension, such as perceived dangerousness (Correll et al., 2002). On average, armed targets will presumably be perceived as more dangerous than unarmed targets (see Figure 1). However, it is expected that the distributions of perceived dangerousness associated with the two types of targets will overlap to some extent (some unarmed targets [e.g., Black individuals] may be perceived as more dangerous than some armed targets [e.g., White individuals]) and a person's level of *sensitivity* will depend on the degree of overlap. It is also assumed that in order for a person to make a decision in the shooting task (to shoot or not shoot) that person must set a decision threshold along the continuum of perceived dangerousness that indicates how dangerous a target needs to be before the participant decides to shoot (see Figure 1). Where this cut-off is placed indicates the participant's *criterion*.

Figure 1. The shooting task from a signal detection perspective

A participant's level of sensitivity and their criterion will directly impact the sorts of decision outcomes that result on any given task, including the shooting task (Swets, 1973). As illustrated in Figure 1, four specific outcomes are possible on the shooting task: deciding that a signal (gun) is present when it actually is (hit), deciding that a signal (gun) is present when it actually is not (false alarm), deciding that a signal (gun) is not present when it is (miss), and deciding that a signal (gun) is not present when it is not (correct rejection).⁴ Higher levels of sensitivity (less overlap in the distributions) will generally allow a person to achieve a higher ratio of correct decisions (hits and correct rejections) to incorrect decisions (false alarms and misses). Having a more lenient criterion (a threshold set lower on the continuum) will result in more hits, but also more false alarms,

⁴ In signal detection analysis, the concern is with the probability that an individual will make these decisions. The probability of making a hit is equal to the frequency of hits divided by the frequency of hits plus the frequency of misses. The probability of making a false alarm is equal to the frequency of false alarms divided by the frequency of false alarms plus the frequency of correct rejections. Misses and correct rejections are simply the complements of hits and false alarms, respectively (i.e., the probability of making a miss is 1 minus the probability of making a hit).

whereas having a more conservative criterion will result in fewer false alarms, but also less hits.

These processes of sensitivity and criterion are thought to relate directly to the automatic and controlled cognitive processes discussed above. Recall that in the race-based shooting task, controlled responding reflects the degree to which participants are able to accurately categorize targets as armed versus unarmed, regardless of race. In signal detection terms, this represents one's sensitivity to the presence of signals (gun) or noise (no gun). The automatic component is assumed to reflect the degree to which participants' responses are biased by the target's race, or the tendency for someone to perceive one racial group as more dangerous than the other. In signal detection terms, this represents a tendency to set liberal versus conservative thresholds along the continuum of perceived dangerousness depending on the race of the target (e.g., requiring less evidence of dangerousness before a shoot decision is made for the racial group that is perceived to be more dangerous).⁵

Several of the simulated shooting studies previously reviewed used signal detection analysis to examine the placement of participants' shooting criterion and their levels of sensitivity. For example, Correll et al. (2002) found that students set a more lenient shoot criterion when faced with Black versus White targets indicating the possible impact of a negative Black stereotype. However, no racial differences were found with

⁵ There is also empirical support for the argument that sensitivity and criterion, as derived from signal detection analysis, reflect controlled and automatic processes, respectively. For example, measures of d' and c correlate very strongly ($>.95$) with other measures that are thought to reflect controlled and automatic processes, such as Payne's (2001) estimates of A and C as derived from his PDP. Studies that have relied on signal detection analysis (e.g., Correll et al., 2002) and Payne's PDP (e.g., Plant et al., 2005) also produce similar results. For each of the upcoming studies, we have confirmed that the signal detection estimates do in fact correlate highly with these other measures of automaticity and control. Other researchers have also confirmed that this is true (e.g., Joshua Correll, personal communication, August 12, 2009)

respect to sensitivity (d'), which is assumed to represent one's ability to rely on controlled processing when making shoot decisions. This finding indicates that the students were equally accurate (or inaccurate) at distinguishing armed from unarmed targets regardless of the target's race.

Across the two studies reported by Correll et al. (2007a), which sampled both community members and police officers, the results were similar to this earlier investigation, at least for c . For example, a main effect was found for race in one of the studies, whereby a lower criterion was set for Black versus White targets (a main effect was also found for experience, such that community members were found to set lower thresholds on average compared to police officers in one of the studies). In addition, while the race by experience interaction (for c) was not significant in either study (although it approached significance in one). A further examination of pair-wise comparisons indicated that community members set lower shoot criteria for Black compared to White targets, as compared to officers. Indeed, officers demonstrated a reduced racial bias for one study (and no racial bias for the other). From these findings, Correll et al. (2007a) conclude that police do in fact differ from community members with respect to officers' criterion placement equivalently across target races.

Regarding sensitivity, interesting differences began to emerge between the community members and police officers. While no significant main effect for target race was observed across either of the two studies conducted by Correll et al. (2007), the consistent main effect of experience across both studies revealed that police officers, on average, were better able to process the information in the simulations compared to community members. In addition, the race by experience interaction (for d') was

marginally significant in both studies. These interactions indicated that community members were significantly more sensitive to White compared to Black targets, whereas police officers were equally sensitive to both target races.

Plant and Peruche (2005) also conducted signal detection analysis on the simulated shooting responses they obtained from their police officer sample. In contrast to Correll et al.'s (2007a) study, their police participants set a much more lenient criterion for Black targets compared to White targets. However, consistent with Correll et al.'s findings, Plant and Peruche (2005) found no significant effect of race for their sensitivity estimates, indicating that the police officers were equally able to discriminate between armed and unarmed targets regardless of target race. Unfortunately, because Plant et al. (2005) did not use signal detection analysis in their study of students, it is difficult to draw meaningful comparisons across their two studies.

Factors that Influence Automatic and Controlled Processes

While signal detection analysis allows researchers to estimate the degree to which participants are relying on automatic and controlled processing, this analysis does not explain why one process may be used to a greater or lesser extent than the other under certain conditions. Thus, it is necessary to also review the factors that are likely to influence these processes in the context of a simulated shooting task. Some of these factors appear to affect the likelihood that automatic biases will be relied on when encountering a task (Devine, 1989; Macrae & Bodenhausen, 2000), whereas others influence the cognitive resources available when performing a task, which will determine the degree to which an individual can rely on controlled processes (Blair & Banaji, 1996; Ferreira, Garcia-Marques, Sherman, & Sherman, 2006).

Racial Stereotypes

As already indicated, one factor that has the potential to increase one's reliance on automatic processes in race-based shooting tasks is knowledge of racial stereotypes. Indeed, for an individual to have an automatic stereotypic bias, the individual must have some knowledge of the racial stereotype. Obviously if individuals are completely unaware of the stereotypic association between Black individuals and aggression (hostility, crime, danger, etc.), it is unlikely that they will exhibit a Black shooting bias when faced with Black and White targets.

It is therefore necessary to measure one's stereotypes in studies of the sort conducted here. This typically involves having participants complete some type of explicit self-report measure. For example, participants might be provided with statements (e.g., "Black people are generally not as smart as White people") and then be asked to rate their level of agreement with the statement (e.g., Henry & Sears, 2002; McConahay, 1986). Alternatively, participants can be presented with adjective checklists (e.g., smart, criminal, aggressive, etc.) and be asked to select those adjectives that they feel best represent a specific racial group (e.g., Devine & Elliot, 1995; Katz & Braly, 1933).

An interesting distinction is now made with regard to explicit measures of stereotypes. Specifically, it is now common practice to distinguish between an individual's knowledge of a cultural stereotype (i.e., what do others think of Black people?) and his or her own personal belief regarding that stereotype (i.e., what do you think of Black people?; Augoustinos & Ahrens, 1994; Devine, 1989; Krueger, 1996). While it seems likely that one's personal beliefs can influence one's decisions (e.g., when deciding whether to shoot a Black target), Correll et al. (2002) argue that simply having

knowledge of negative cultural stereotypes about Black individuals may be enough to activate the stereotype and influence behaviour.

Interestingly, previous studies have actually shown that the relationship between explicitly measured stereotypes (either cultural or personal) and shooting decisions is inconsistent. For example, Correll et al. (2002, Study 3) found that responses on the Modern Racism Scale, the Discrimination Scale, and the Diversity Scale did not significantly correlate with shooting bias ($r = .15$, $r = .16$, $r = .05$, respectively). However, in the same study, knowledge of cultural stereotypes did significantly relate to shooting bias ($r = .37$, $p < .01$), as did the amount of contact the participant had with Black individuals ($r = .38$, $p < .01$). To confuse the matter further, in a later study by Correll et al. (2007a) the reverse was found for community members. In this case, cultural stereotypes were uncorrelated with shooting bias ($r = .09$), but personal stereotypes were significantly correlated ($r = .20$, $p < .05$).

It is likely that part of the problem in understanding the relationship between measures of explicit racial attitudes and performance on tasks like the shooting task is the tendency for participants to respond in socially desirable ways on explicit stereotype measures (Correll et al., 2007a; Devine, 1989). Indeed, research has clearly demonstrated how unwilling people can sometimes be in making their personal biases known to others and thus, it is perhaps unsurprising that responses to explicit measures do not tend to correlate well with shooting performance (e.g., Devine, Plant, Amodio, Harmon-Jones, & Vance, 2002; Fazio, Jackson, Dunton, & Williams, 1995). One common way of trying to examine this issue is to have participants also complete the Motivation to Control Prejudiced Reactions Scale (MCPRS), a scale that measures individual differences in

terms of the extent to which people seek to control the expression of their own prejudiced reactions (Dunton & Fazio, 1997). By having participants complete this scale, one can gain insight into the extent to which socially desirable responding is moderating the relationship between explicit racial biases and performance on race-based tasks.

The problem, of course, is that the MCPRS is also an explicit measure, and thus prone to socially desirable responding. Given this, it is important when investigating racial stereotypes to include some form of implicit stereotype measure (Hofmann et al., 2005). Implicit cognitions refer to automatic associations that occur outside of one's awareness, but that still have the ability to influence one's behaviour (Devine, 1989). One of the most popular methods for measuring implicit cognitions is the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). This test is designed to measure the strength of an automatic association between mental representations of objects in memory (e.g., the concepts of good and bad with groups such as Black and White). The IAT has an advantage over explicit measures because it has been shown to be able to access personal stereotypic beliefs, even for individuals who try to control their biases (Kim, 2003).

Studies using both implicit and explicit measures to study racial stereotypes have shown that the two measures are sometimes significantly correlated ($r = .42$; McConnell & Leibold, 2001). However, other studies have shown the opposite ($r = .02$; Dasgupta, McGhee, Greenwald, & Banaji, 2000). What is clear is that while responses to the measures may sometimes be correlated, they are measuring relatively distinct constructs (Nosek & Smyth, 2007). For instance, Greenwald et al. (1998; Study 3) had participants complete multiple explicit racial stereotypes measures, in addition to a race-IAT. Results

demonstrated that the implicit measure identified stronger racial stereotypes than any of the explicit measures. Similar results have been reported by Fazio and Olson (2003), Hofmann et al. (2005), and Glaser and Knowles (2008).

In the context of simulated shooting studies, only explicit stereotype measures have ever been used. In the current dissertation, a more diverse range of stereotype measures will be explored (e.g., explicit measures, the MCPRS, the race-IAT) to clarify the role racial stereotypes play when making simulated shooting decisions.

Experience with Shooting Tasks

The knowledge of, or endorsement for, racial stereotypes potentially influences the likelihood that a stereotype will be activated and that an automatic response will be elicited. In contrast, several other factors exist that can potentially influence one's ability to control stereotypic responses. One such factor is the level of experience that an individual has with the shooting task. Experience may influence the ability to use controlled processes when making shooting decisions in the same way that it enhances one's ability in other contexts (e.g., vehicle control, Horrey & Simons, 2007; clinical diagnoses, Burgess, 2009).

In support of this suggestion, Correll et al. (2007a) found that police officers did not exhibit the same degree of racial bias as community members (except for response latencies). Correll et al. (2007a) state that police training and/or field experience may be what allows police officers to behave in such an unbiased manner. Presumably, training or experience can do one of two things: (1) reduce racial stereotypes if, in the officer's training or real-world use of force encounters, they recognize that race and weapon presence are often unrelated and/or (2) allow police officers to acquire task-relevant

schemas, freeing up the cognitive resources required to conduct controlled scans of shooting scenes like those used by Correll et al.

With respect to the first possibility, it is debatable whether police training or field encounters would reduce general negative stereotypes towards Blacks. For example, on the one hand, a sizeable portion of crime in the U.S. appears to be committed by Black individuals (Bureau of Justice Statistics, 2007), Black individuals are disproportionately involved in use of force encounters (Terrill & Mastrofski, 2002), and these encounters often result in more severe levels of force than encounters with White individuals (Lersch, Bazley, Mieczkowski, & Childs, 2008). All of these things would presumably increase Black shooting biases. On the other hand, however, many things exist in the world of policing that can counteract these biases. For example, police forces frequently attempt to screen out applicants who possess overt racial stereotypes (Smith & Alpert, 2000), diversity training is often provided to officers to reduce any remaining racial biases (e.g., Huisman, Martinez, & Wilson, 2005; Marion, 1998), and police officers presumably develop shooting schemas through their training and encounters that may allow them to reduce the activation of racial stereotypes (Correll et al., 2007a), in addition to performing more efficient scans of scenes to determine the presence of weapons (as described in more detail below).

The second possibility seems more plausible and corresponds to previous findings, which indicate that police officers possess a greater ability than community members to use controlled processing to discriminate between armed and unarmed targets (e.g., Correll et al., 2007a). Given research conducted in other areas, it is likely that as a result of their training and/or experience, police officers develop task-relevant

schemas that would allow them (to a greater extent than non-police professionals at least) to conduct relatively rapid scans of scenes in order to base shooting decisions on relevant cues (e.g., weapon presence) rather than target race. Indeed, there is substantial evidence that schemas are acquired through practice in other domains of expertise (e.g., Alevén & Koedinger, 2002; Cornford & Athanasou, 1995; Kirschner, 2002; van Gog, Ericsson, Rikers, & Paas, 2005), and there is no reason to suspect that this would not also be true in the policing domain (Bennell, Jones, & Corey, 2007).

How would acquired schemas allow police officers to carry out these controlled scans of scenes? It is generally accepted that only a few elements of information can be processed at once without overloading cognitive resources (i.e., working memory) and decreasing one's processing ability (Baddeley, 1986). However, through their network structure, acquired schemas enable people to store and organize large amounts of information in a very efficient way, which in turn allows them to chunk information that is being processed, so that multiple pieces of information can be treated as single elements (Chi, Glaser, & Farr, 1988). By allowing this to happen, more information can be processed without placing undue strain on one's cognitive resources (Kirschner, 2002; Sharps, 2010). There is evidence that this is true when carrying out tasks like the shooting task, where categorization decisions need to be made (e.g., Govorun & Payne, 2006; Kalyuga, Ayres, Chandler, & Sweller, 2003; Paas, Renkl, & Sweller, 2004).

This controlled processing argument is compatible with findings from existing shooting studies. For example, the fact that Correll et al. (2007a) found little evidence of a racial bias with police participants may be due to the fact that they possessed task-relevant schemas that allowed them to conduct rapid scans of the scenes. The fact that

Plant and Peruche (2005) did find evidence for police bias is also able to be understood from this perspective, given the low level of realism associated with their stimuli (superimposed objects on the forehead of targets). Police officers in their study may have possessed the same types of schemas as Correll et al.'s (2007a) officers, but these schemas may have been of little use given the novel experimental stimuli. Of course, if practice is what results in the formation of schemas, one might expect that even the police officers in Plant and Peruche's study might slowly get better (i.e., showing less racial bias) at their unusual shooting task as a result of being able to rely more on controlled processes. As described in more detail below, this is exactly what happened in that study.

Task Difficulty

While experience likely increases one's ability to use controlled processing, there are other factors, such as task difficulty, that likely reduce one's ability to elicit controlled responses. Specific to the current task, there are numerous factors that will influence the difficulty of shooting scenarios. For instance, as demonstrated by Correll et al. (2002, Study 2), reducing the response window for participants from 850ms to 630ms caused substantially more errors and a lower decision criteria for Black targets, indicating an increased reliance on automatic, compared to, controlled processing. Similar results were also found by Correll et al. (2007a, Study 2) and Payne (2001).

Tasks can also be made more difficult by manipulating the visual complexity of the scene. For example, consider the study by Stinchcombe and Gagnon (2009), which used a driving simulator to examine the impact of task complexity on driving performance. Their results demonstrated that when participants were exposed to high complexity scenes (e.g., a busy urban city-centre) versus low complexity scenes (e.g., a

plain straight road), they made more driving errors and took longer to make driving responses. Similar results have been reported by Sharps and Hess (2008) using a similar shoot/don't shoot task to Correll et al. (2002). In their study, participants viewed photos depicting a potentially violent crime scene, in which a male target was holding a gun, and had to make shoot/don't shoot decisions. One scene was simple (i.e., few distracter items), whereas another was more complex (i.e., numerous distracter items). Results showed that the proportion of participants choosing to shoot rose significantly between the simple and complex scene.⁶ The addition of distracter items appears to place more of a strain on participants' cognitive resources because they are attending to more elements in each scene (Clark, Nguyen, & Sweller, 2005), and as a consequence, performance suffers.

Another study examined the relationship between cognitive load and stereotypic responding (Wigboldus, Sherman, Franzese, & Knippenberg, 2004). Specifically, participants read sentences that were either stereotype-consistent or stereotype-inconsistent, and were later asked whether certain stereotype confirming words were present in the sentences. Results provided evidence that stereotypes are particularly likely to influence responses (i.e., endorsing stereotypic traits) when cognitive load was high (i.e., processing capacity is strained). That being said, there is research suggesting that when an individual's cognitive load is high, more attention is actually paid to stereotype-inconsistent rather than consistent information (Sherman, Conrey, & Groom, 2004). Clearly, more research is needed to clarify this issue.

⁶ Interestingly, these researchers also included trials where the target's gun had been substituted for a power screwdriver and results showed no significant differences between the number of participants who shot the armed target and those who shot the target holding a screwdriver.

Overall, what is clear is that numerous factors have the potential to influence the role that automatic and controlled processes play in certain tasks. This project will explore several of these factors – including explicit and implicit stereotypes, task experience, and task difficulty – in hopes of clarifying how they impact shooting performance. A final factor that has been shown to influence racial biases in shooting behaviour is training (Correll et al., 2007a; Correll, Park, Judd, & Wittenbrink, 2007b; Plant & Peruche, 2005; Plant et al., 2005).

Training to Improve Performance on the Shooting Task

Many training strategies exist that can potentially reduce the activation of racial stereotypes or enhance one's controlled responses to them (e.g., Blair, Ma, & Lenton, 2001; Bodenhausen, Schwarz, Bless, & Wänke, 1995; Dasgupta & Greenwald, 2001; Gawronski, Deutsch, Mbrikou, Seibt, & Strack, 2008; Kawakami, Dovidio, Moll, Hermsen, & Russin, 2000; Rudman, Ashmore, & Gary, 2001). However, few of these strategies have been applied to the problem of racially biased shooting behaviour. Of the strategies that have been applied to this problem, serious questions exist about the practical utility of the strategies (e.g., whether the training can actually be implemented to improve real shooting decisions). In the section that follows, the sorts of training strategies that have been examined in the shooting context will be briefly discussed, but special attention will be paid to one particular training strategy – the use of implementation intentions – given that this strategy appears to be highly practical and effective in reducing biases across a range of tasks (e.g., Gollwitzer, Fujita, & Oettingen, 2004; Stewart & Payne, 2008), including simulated shooting tasks (e.g., Mendoza et al., 2010).

Training Strategies to Reduce the Racially Biased Shooting Decisions

To date, only a handful of studies have examined training strategies to reduce racially biased shooting behaviour. For instance, Plant et al. (2005) conducted a study that included a training group, who completed practice trials depicting Black and White faces that were equally likely to be paired with a gun or neutral object, and a control group, who completed similar practice trials that involved swatting simulated insects and birds on a computer screen. Both groups then received test trials using the simulated shooting task, and results showed that the training group, who had learned that race was unrelated to accurate object detection through practice trials, made significantly fewer racially biased errors than the control group. This effect was maintained 24 hours, post-training.

Related to Plant et al.'s (2005) study was another study conducted by Correll et al. (2007a, Study 3). They had participants complete the simulated shooting task twice on two separate days, using the same logic as Plant et al. (2005), whereby it was anticipated that with successive exposure to the shooting task (where race was unrelated to object type) performance would improve. Results showed that participants had pronounced within-day improvements, but showed no evidence that practice carried over to the next day, suggesting that this effect subsides after 24 hours.

In addition to this strategy, Correll et al. (2007b) examined another method for reducing racially biased shooting decisions. They randomly assigned participants to one of two experimental groups where the level of covariation between target race and object type (gun or neutral object) was manipulated to reflect specific biases. The stereotype-congruent group was systematically exposed to a higher portion of Black targets with

guns and White targets with no guns. The stereotype-incongruent group received the reverse. Results of the test trials (with an equal number of armed/unarmed Black and White targets) demonstrated that those in the stereotype-congruent group were more likely to exhibit a shooting bias towards Black targets, which suggests that it is possible to reduce racial biases in shooting behaviour by repeatedly presenting people with stereotype-incongruent information.

Taken together, it is clear that training strategies do exist that can reduce the degree of racial bias that is shown in shooting decisions made by participants in simulated shooting scenarios. However, there are arguably two problems with the types of strategies examined by researchers in this area. First, one could debate the practical utility of training strategies that rely on time consuming repetition, especially when the training only leads to temporary reductions in racially biased responding. Police agencies and training academies generally do not have a lot of time to dedicate to training of this sort, nor the time to provide regular refresher training (Marion, 1998; Morrison, 2006). Second, the types of training strategies examined so far are designed to enhance the degree to which one can control responses to activated stereotypes. Such strategies might have limited utility in the real world given that many naturally occurring factors (e.g., high scene complexity, short response windows, etc.) will limit one's ability to rely on controlled processes.

If accepted as problematic, these issues suggest that a suitable training strategy for reducing racially biased shooting must meet certain criteria. The training must be able to be provided in a relatively short amount of time and lead to long term reductions in biased behaviour. If refresher training is necessary, that training must also be able to be

provided quickly and with little cost. Arguably, the training should also focus less on enhancing one's ability to use controlled processing and more on preventing stereotype activation in the first place. One approach to training that meets all of these criteria – it appears to work in some contexts, it is practical, and it operates by reducing automatic biases – is a strategy known as implementation intentions (Gollwitzer, 1999).

Implementation Intentions and the Shooting Task

Implementation intentions are essentially “if-then” action plans (e.g., “When I leave work, I will go exercise at the gym”) (Brandstätter, Lengfelder, & Gollwitzer, 2001). It has been shown that people are more likely to accomplish their goals (i.e., go to the gym) when they use these action plans, instead of simply stating their intention (i.e., I will go to the gym; Gollwitzer & Brandstätter, 1997). Indeed, a recent meta-analysis by Gollwitzer and Sheeran (2006) has demonstrated the potential power of implementation intentions. They reviewed findings from 94 studies and found medium-to-large positive effects ($d = .65$) when implementation intentions were used to target things such as school work completion (Gollwitzer & Brandstätter, 1997), exercise enhancement and nutrition initiatives (Milne, Orbell, & Sheeran, 2002; Verplanken & Faes, 1999), and the performance of health self-exams (Milne & Sheeran, 2002; Sheeran & Orbell, 2000). This strategy seems to work primarily because of the “if” portion of the statement, which strengthens the association between the environmental cue (i.e., when I leave work) and the goal-directed behaviour (i.e., going to the gym; Aarts & Dijksterhuis, 2000).

Because overcoming a stereotype can be framed as a goal pursuit, two recent studies have examined whether implementation intentions can be used to reduce negative Black stereotypes. First, Stewart and Payne (2008) applied this strategy to the weapon

identification task. One group of participants was given the implementation intention to “think safe” when presented with Black targets (i.e., When I see a Black suspect, I will think “safe”). These participants were compared to two other groups of participants, who were told to either think “quick” or think “accurate” (these instructions, being inherent to the task, should not necessarily reduce stereotype activation, but they control for the possibility that *any* implementation intention will reduce bias). Using Payne’s (2001) process dissociation procedure, the implementation intention to think “safe” when interacting with Black suspects, worked such that these participants showed significantly less racial bias compared to the other two groups. The implementation intention appeared to have its effect because it reduced the activation of racial stereotypes when presented with the race prime (rather than enhancing controlled responding).

Second, and of more relevance to the current dissertation, Mendoza et al. (2010) examined the effectiveness of both a distraction-inhibiting implementation intention (i.e., “If I see a person, then I will ignore his race”) and a response-facilitating implementation intention (i.e., “If I see a person with a gun, then I will shoot” and “If I see a person with an object, then I will not shoot”) using a shooting task that was similar to the one used by Correll et al. (2002). Results using both types of implementation intention strategies were encouraging. The distraction-inhibition technique improved shooting accuracy by reducing the activation of automatic stereotypes. In contrast, the response-facilitating technique improved shooting accuracy by enhancing controlled processing without affecting the activation of stereotypes.

Importantly, however, while the majority of research using implementation intentions has been promising, some studies have failed to find a positive effect (e.g.,

Koestner, Leles, Powers, & Chicoine, 2002; Powers, Koestner, & Topciu, 2005). For instance, Budden and Saharin (2007) examined the impact of implementation intentions on exercise and their results showed a backfire effect, whereby participants who did not form an implementation intention exercised significantly more than those who did. Of course, finding such a backfire effect in shoot/don't shoot scenarios would be very serious. Therefore, it is worthwhile to study this training strategy further to see if it can be used to reduce racially biased shooting decisions.

Summary

This literature review has highlighted the key research upon which the current studies are based. It briefly reviewed the general stereotype literature and demonstrated the existence of a specific racial stereotype of Black individuals (e.g., as hostile, aggressive, criminal, etc.). It also examined how these stereotypes can impact decision making in simulated shooting tasks, and highlighted potential cultural differences that have emerged in American versus Canadian research. The role of automatic stereotype activation and controlled processing were introduced as a way of explaining why some individuals (e.g., police officers) may be less likely to exhibit racially biased shooting behaviour. Factors that can influence these processes were also highlighted and implementation intentions were presented, as one possible training strategy that might be able to reduce biased shooting decisions.

The proposed studies generally investigate the influence of target race on shooting performance using Canadian participants. Study 1 will investigate whether the degree of racial bias observed in one's shooting decisions is influenced by the participants' level of police experience. Study 2 will build upon this study by varying the complexity of the

scenes encountered by participants who vary by police experience to see if complex scenes decrease one's ability to use controlled processing and thus, increase racially biased decisions. Finally, Study 3 will examine whether it is possible to reduce any racial biases that emerge in Study 1 and 2 by using implementation intentions that have proved useful for reducing racial biases in previous studies.

CHAPTER 2

The Influence of Police Experience in a Simulated Shooting Task (Study 1)

Purpose

The primary goal of Study 1 was to determine whether one's performance on a simulated shooting task is influenced by police experience. Specifically, this study examined whether those with more police experience showed less racial bias on this task compared to non-police professionals. Secondary goals of this study were to determine how a range of measures relate to shooting performance, including measurements of cognitive load, explicit and implicit racial stereotypes, and motivation to control prejudiced reactions.

Method

Pilot Work

To investigate the impact of target race on shooting performance, it was first necessary to create photo stimuli to use in the shooting task. In line with previous research (e.g., Correll et al., 2002, 2007a), Black and White models were photographed in various poses (e.g., kneeling, standing, etc.) holding various items (e.g., mock handgun, cell phone, etc.). These photos were superimposed on a variety of real-world background images, which are described in more detail below.

Participants for Pilot Work

A total of 20 models were recruited from various places on the Carleton University campus (e.g., library, residences, etc.). A total of 10 Black and 10 White models were photographed. Each model was paid \$10 for participating.

Procedure for Pilot Work

All models completed the photo-shoot in the Police Research Lab and were provided with instructions detailing the different poses and hand positions to be used. Models were asked to position themselves in five different poses (examples of each pose were displayed). While in each pose, participants held each of the following four items: two threatening items (black and silver mock handguns) and two non-threatening items (black wallet and silver cell phone). Two photos were taken of each model in each of the poses while holding each of the items to ensure that a high quality photo would be available. This resulted in 40 photos per model (4 items x 5 poses x 2 photos each). All models were standing in front of a white wall during the photo shoot and a Sony Cyber-shot digital camera was used to take the photos. Upon completion of the photo-shoot, models were debriefed and paid.

In addition to these photos, other photos were taken of indoor/outdoor locations at various locations on campus and within the community (e.g., by the river, parking lot, apartment building, etc.). Twenty specific scenes were photographed and selected to mimic environments where a police officer might encounter a suspect. All of the models' photos were then uploaded into Adobe PhotoShop and the best photos (i.e., models' eyes open, sharp image, consistent lighting, etc.) were superimposed onto each background image. Appendix A provides a sample of the stimuli.

Manipulation Check of Pilot Work

A manipulation check was performed for all photo stimuli to be used in the shooting task to determine if they could be used in the shooting task. The manipulation check was completed to ensure that there were no systematic differences between photos

featuring Black and White targets besides the variable of target race. An independent sample of 25 student participants examined the photos, which were displayed as PowerPoint slides, and rated all 80 photos on four criteria using the following scales: (1) how easy it was to see the object in the target's hand (1 = extremely easy to 9 = extremely hard), (2) the visual complexity of the scene (1 = not complex to 9 = extremely complex), (3) how intimidating they found the target to be (1 = not at all intimidating to 9 = extremely intimidating), and (4) the extent to which they believed the target belonged to a gang (1 = not at all likely to 9 = extremely likely). Independent-samples t-tests were used to examine the extent to which ratings on these criteria differed across target race.

The results of the manipulation check indicated that there was no significant difference across the Black ($M = 2.68$, $SD = 1.99$) and White ($M = 2.51$, $SD = 1.99$) photos with respect to how easy it was to see the object, $t(1995) = 1.78$, $p = .075$, 95% CI $[-.02, .33]$. Nor was there a significant differences across the Black ($M = 3.23$, $SD = 2.03$) and White ($M = 3.10$, $SD = 1.97$) photos with respect to the complexity of the scene, $t(1995) = 1.39$, $p = .165$, 95% CI $[-.05, .30]$. However, there was a significant difference between the Black ($M = 3.67$, $SD = 2.40$) and White ($M = 3.41$, $SD = 2.36$) photos in terms of how intimidating the targets were perceived to be, $t(1995) = 2.41$, $p = .016$, 95% CI $[.05, .47]$. There was also a significant difference between the Black ($M = 2.66$, $SD = 1.98$) and White ($M = 2.10$, $SD = 1.70$) photos in terms of perceptions of gang membership, $t(1995) = 6.83$, $p < .001$, 95% CI $[.40, .73]$. Given the stereotype research just reviewed, these differences were expected and thus, the photos were still deemed appropriate for the simulated shooting task based on the responses from the first two scales.

Participants

Study 1 consisted of 146 participants, of whom 50 were undergraduate students from Carleton University, 47 were police recruits attending the Ontario Police College (OPC), and 49 were police officers attending advanced training at the OPC. In addition to being eligible for a financial reward based on their shooting performance in the experimental task, the students were given course credit for their participation and the police recruits/officers were provided with a letter to their Chief indicating participation.

The total gender make-up of the sample included 97 males and 49 females. Across the three groups, there was a significant difference with respect to gender, $\chi^2 = 17.72, p < .001$, whereby the student sub-sample was more evenly split between males and females (Male = 22, Female = 28) compared to the recruits (Male = 35, Female = 12) and officers (Male = 40, Female = 9). This difference was expected and speaks to the relatively low number of female recruits/officers at the OPC. The average age of participants was 29 years ($SD = 9.27$), but there was a significant difference in age between the groups, $F(1, 145) = 126.03, p < .001$. Unsurprisingly, students ($M = 20.84, SD = 4.62$) were significantly younger than recruits ($M = 27.72, SD = 5.67$) and both of these groups were significantly younger than officers ($M = 38.63, SD = 6.42$). The highest level of participants' education was recorded (High school = 34, College = 53, Undergraduate = 48, Master's = 7, Doctorate = 1, Other = 3). The ethnicity of the entire sample was as follows: White = 103, Black = 8, Asian = 8, Middle Eastern = 4, Aboriginal = 11, Other = 11, No response = 1. With respect to minority status, the difference across groups approached significance, $\chi^2 = 6.03, p = .051$. There was a noticeably higher proportion of minority participants in the students group (minority =

19, non-minority = 31) compared to the recruits (minority = 8, non-minority = 39) and officers (minority = 11, non-minority = 38).

Measures

The shooting task. This shooting task, which is based on the task used by Correll et al. (2002, 2007a), exposed participants to shoot/don't shoot scenarios involving armed or unarmed Black or White targets (the stimuli was delivered using E-prime on a desktop computer). Participants were instructed to respond as quickly as possible when exposed to a target by pressing one of two computer keys. They were to press the "shoot" key if the target was armed (i.e., holding a black or silver gun) and the "don't shoot" key if the target was unarmed (i.e., holding a wallet or cell phone). The task consisted of 16 practice trials and 80 test trials. Shooting decisions and reaction times for each decision were recorded by the computer for analysis.

For any given trial, a random number (0-3) of background images appeared on the screen, drawn from the set of 20 background images taken in the stimuli development phase. Each background image remained on the screen for a random period of time (from 500ms to 800ms). Subsequently, another background image was presented for a random duration before an armed or unarmed Black or White target appeared embedded in the background in a random location (each target was randomly assigned to a particular background, with the restriction that each type of target [i.e., armed Black, armed White, unarmed Black, unarmed White] was represented with equal frequency in each background). The response window to make a shoot/don't shoot decision was 630ms (following exposure to the target).

After each trial, participants received feedback on whether they made a correct decision on that specific trial, and a summary of the participant's overall score was presented after the last trial. Consistent with Correll et al.'s (2002, 2007a) study, a hit (correctly shooting a target holding a gun) earned 10 points and a correct rejection (not shooting a target holding a cell phone or wallet) earned 5. A false alarm (shooting a target holding a cell phone or wallet) lost 20 points and a miss (not shooting a target holding a gun) lost 40. There was also a "timed out" penalty of 10 points if a participant failed to make a response within the allotted response window (630 ms). These point allocations were designed to mimic the cost/benefits of a real-world shooting situation and to motivate participants to perform well (the first, second, and third highest scorers won cash prizes).

Measures of cognitive load. Two measures of cognitive load were completed by participants immediately after the shooting task (see Appendix B; DeLeeuw & Mayer, 2008; Paas, 1992). The first measure was an effort rating, whereby the participants were asked to rate the amount of mental effort exerted during the task on a 9-point scale ranging from 1 (extremely low mental effort) to 9 (extremely high mental effort). The second measure was a difficulty rating, whereby the participants rated how difficult they found the task on a 9-point scale ranging from 1 (extremely easy) to 9 (extremely difficult). Participants' two self-report ratings are used for analysis, as this is consistent with how others assess cognitive load in experimental tasks and has been relied upon with higher frequency than any other measures (e.g., secondary task technique, heart rate variability; Paas, Renkl, & Sweller, 2003; Paas, Tuovinen, Tabbers, & Van Gerven, 2003).

Explicit stereotype measures. Two measures of explicit racial attitudes were used. First, participants were asked to complete the Symbolic Racism 2000 Scale (SRS; Henry & Sears, 2002). The SRS includes 8 items asking participants to rate their agreement from 1 (strongly agree) to 4 (strongly disagree), except for one item with a 3-point rating scale (see Appendix C). Five of these items were reverse scored. All item scores were then summed, and each participant received an overall score, with a possible range of 8-31. Higher scores on this scale indicate a higher level of symbolic racism.

This scale was chosen for several reasons. First, it is the most recent symbolic racism scale. Second, the scale is psychometrically sound, with a reasonable level of internal consistency (range in alpha scores of .59-.79 across five studies) and reasonably high levels of predictive validity (high correlation with racial policy preference [$r = .58$], conservative political predispositions [$r = .46$], and a slightly lower correlation with traditional racial attitudes [$r = .17$]). Third, unlike some other explicit racism measures, the SRS is relevant to Canadian samples in that the items do not refer to specific government programs, policies, or actions from other countries, as is often the case with other racism measures (e.g., Modern Racism Scale, Perception of Racism Scale). Lastly, because of the low number of items included on the scale, it is quick and easy to administer.

In addition to this scale, a measure to assess each participant's knowledge of and endorsement for racial stereotypes was used. Specifically, a modified version of Devine and Elliot's (1995) approach was used, whereby participants were asked to choose adjectives from a list that best describe either a Black person or White person category. Each participant was provided with 18 negatively valenced adjectives (e.g., violent,

dangerous, etc.) and asked to select the words that best described each racial group (see Appendix D; Krueger, 1996). Because the focus of this project was on the stereotype of dangerousness, the majority of the adjectives reflected this construct. Participants selected adjectives based on their views of the *cultural stereotypes* surrounding Black and White people and also their *personal stereotypes*. Participants received four separate overall scores with a possible range of 0-18, depending on the endorsement of negative stereotypes for the cultural and personal views of both Black and White individuals. The higher the score, the more negative stereotypes identified specific to the particular group.

Measure of motivation to control prejudice. Participants also completed the Motivation to Control Prejudiced Reactions Scale (MCPRS; Dunton & Fazio, 1997). The MCPRS contains 17 items comprising two factors: (1) external control, describing a concern with acting prejudiced or being viewed as prejudiced by others, and (2) internal control, describing a willingness to inhibit the expression of one's thoughts and feelings in the interest of avoiding disputes (see Appendix E). Participants were asked to indicate their agreement with each item on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). The possible range of scores is 9-45 for the external scale and 8-40 for the internal scale. External and internal scale scores were calculated, as well as a summed overall score of motivation to control prejudiced reactions (with a range of 17-85).

Implicit stereotype measure. In addition to the explicit stereotype measures previously discussed, an implicit stereotype measure was used (Karpinski & Hilton, 2001). The race-IAT was chosen for this purpose. In the race-IAT, respondents must sort pictures of individuals (e.g., Black or White faces) and words (e.g., associated with the constructs bad or good) into one of four categories by pressing one of two keys on a

computer keyboard. Thus, two categories (e.g., Black or bad) are indicated by one key while the remaining two categories (e.g., White or good) are indicated by the other key. Response time is expected to depend on the extent to which the categories that share one key are associated in one's memory.

In the race-IAT completed by participants (see Figure 2), the specific task was to sort pictures or words into one of the following categories: *White*, *Black*, *good* or *bad*. Stimuli for the *White* versus *Black* categories were four pictures of Black people's faces and four pictures of White people's faces (see Appendix F). Photos of the Black and White individuals were taken from Anthony Greenwald's website (the creator of the IAT). These photos can be used free of charge for research purposes (Project Implicit, 2008a). The stimuli chosen to represent the concepts of *good* and *bad* are commonly used with IATs and could not be confounded between categories (Project Implicit, 2008b). The stimuli *good* words were *glorious*, *love*, *peace*, *pleasure*, *happy*, *joy*, *wonderful* and *laughter*. The stimuli for the *bad* words were *failure*, *horrible*, *awful*, *evil*, *agony*, *nasty*, *terribly*, and *hurt*.

This test is designed to measure the strength of an automatic association between mental representations of objects in memory, and it has been shown to be able to access personal stereotypic beliefs, even for participants who are trying to control their racial biases (Dasgupta et al., 2000; Kim, 2003). During the first stage of the race-IAT participants are asked to categorize faces of Black or White people that are flashed on the screen into the correct race, which are listed in the two top corners of the screen (by pressing designated computer keys). During the second stage, the word stimuli are presented on the screen representing the constructs of either *good* or *bad*, and participants

must categorize these words into the appropriate categories (by pressing designated computer keys). In the next stage, participants categorize the faces and words, but the constructs of interest are paired and listed in the top corners of the computer screen (e.g., White or good and Black or bad). The final stage switches the combination of constructs (i.e., White or bad and Black or good), but the task remains the same. For someone who has an implicit association linking White people with “bad”, response times should be quicker when *White* and *bad* share the same response key (as in Figure 2). Conversely, for someone who implicitly views White people as “good”, the reverse would be expected.

In line with current recommendations for how to score the IAT (e.g., delete all trials with responses greater than 10,000ms, delete participants with more than 10% of trials with responses less than 300ms), an overall race-IAT score was calculated. This score is calculated by taking the difference in response times between the two blocks of trials, where *Black* was associated with *bad* (and *White* with *good*), and where *Black* was associated with *good* (and *White* with *bad*). That is, two mean differences are calculated by subtracting the two blocks from one another, and the resulting D score is the average of these two ratios (Greenwald, Nosek, & Banaji, 2003; Kim, 2003). Based on the way the D score is calculated, higher scores indicate a stronger implicit association between *Black* and *bad* (and *White* and *good*), with the possible range between $-/+ 2$.

Figure 2. Example of trials in the race-IAT.

Demographic questionnaire. Before being debriefed, a demographic questionnaire was provided to participants (see Appendix G). This questionnaire asked for information related to the participant's age, gender, ethnicity, highest level of education, program of study (for students), year of study (for students), number of hours per week playing first-person shooter video games, years of law enforcement experience, a description of law enforcement experience (i.e., department and rank), number of total hours of firearms training (for police), number of shooting incidents involved in while on duty (for police), and number of shots fired while on duty (for police). The final section of the demographic questionnaire asked participants to rate their interactions with Black and White individuals, in terms of frequency (1 = not at all, 5 = extremely often) and valence (1 = extremely negative, 5 = extremely positive), using two separate 5-point scales for each race.

Procedure

Student participants completed the study in the Police Research Lab on the Carleton University campus. Police recruits and officers completed the study after training hours in an office at the OPC. All participants completed the study individually using the same type of desktop computer (IBM Think Centre with an 18" x 12" flat screen Lenovo monitor). All forms, tasks, and measures were delivered electronically to the participant using the E-prime software package (Psychology Software Tools, 2009). In terms of the order of tasks, participants first completed an electronic informed consent form (see Appendix H). They then received instructions for the shooting task. After completing the practice and test trials of the shooting task, participants were prompted to provide their cognitive load ratings of the task. Next, *in random order*, participants completed the explicit stereotype measures, the MCPRS, or the race-IAT. Finally, all participants completed the demographic questionnaire and were debriefed (see Appendix I). During the debriefing, all participants were given the opportunity to provide feedback about the study.

Hypotheses

Based on the previously cited literature, the following hypotheses were tested in Study 1:

1. (a) The criterion for Black targets will be lower (more lenient) than for White targets, indicating a bias towards shooting Black targets.
(b) The criterion will vary as a function of police experience, such that students will set a lower criterion than police officers.

- (c) The analysis of the criterion will reveal a Race x Experience interaction with students setting a lower criterion for Black targets compared to White targets, but police officers setting a similar criterion for both Black and White targets.
 - (d) Sensitivity will vary as a function of police experience, such that students exhibit lower levels of sensitivity than police officers.
 - (e) The analysis of sensitivity will reveal a Race x Experience interaction with students showing lower levels of sensitivity for Black targets compared to White targets, but police officers showing similar levels of sensitivity for both Black and White targets.
2. (a) Reaction times will vary as a function of police experience, such that participants with more police experience will make faster correct responses than those with less police experience.
- (b) The analysis of reaction times will reveal a Race x Object interaction, whereby armed Black targets will be shot quicker than armed White targets and participants will not shoot unarmed White targets more quickly than unarmed Black targets.
- (c) There will be a Race x Object x Experience interaction for reaction times, such that those with less police experience are expected to respond faster to armed Black targets (and unarmed White targets) compared to armed White targets (and unarmed Black targets). In contrast, there will be no difference in reaction times for those with more police experience when encountering armed Black and White targets, or unarmed Black and White targets.

3. (a) Error rates will vary as a function of police experience, whereby participants with more police experience will make fewer errors than those with less police experience.

(b) The analysis of error rates will reveal a Race x Object interaction, whereby armed Black targets will be shot more often than armed White targets and participants will not shoot unarmed White targets more often than unarmed Black targets.

(c) The analysis of error rates will reveal a Race x Object x Experience interaction. Specifically, it is expected that those with less police experience will more often shoot armed Black targets (than armed White targets) and more often not shoot unarmed White (than unarmed Black). In contrast, there will be no difference in error rates for those with more police experience when encountering armed Black and White targets, or unarmed Black and White targets.
4. (a) Cognitive load should vary as a function of police experience, such that students experience higher levels of cognitive load on the shooting task compared to police officers.

(b) Cognitive load should be positively correlated with automatic responding (as measured by the criterion estimates).

(c) Cognitive load should be negatively correlated with controlled responding (as measure by the sensitivity estimates).
5. (a) Explicit and implicit stereotype measures (where higher scores indicate a more negative stereotype towards Black individuals) will be positively correlated with levels of Black racial bias on the shooting task.

(b) The relationship between the SRS and levels of Black racial bias on the shooting task, and between the personal Black responses on the adjective checklist and levels of Black racial bias on the shooting task, will be moderated by the degree to which participants are motivated to control their prejudice (i.e., a positive correlation between these stereotype measures and Black racial bias is expected only for participants who score relatively low on the MCPRS).

Results

Preliminary Data Screening

All raw data were examined during a preliminary screening. This step was completed in order to ensure the accuracy of the subsequent results and to inform the selection of appropriate statistical tests. The shooting data (e.g., errors, RT)⁷ and all other measures of cognitive load and explicit/implicit stereotypes were examined for the following issues: missing data, outliers, normality, and homogeneity of variance.

Missing data.

Shooting data. The computer program (E-prime) used to present the shooting task required that participants complete each task in sequence before being able to proceed to the next task. This ensured that participants were unable to miss any aspect of the shooting task. Therefore, all data relating to error rates and RTs were complete.

Cognitive load and stereotype data. E-prime was also used to present all cognitive load and stereotype measures to participants. Again, given the automated nature of the tasks, participants had to enter a response in order to continue to the next question and thus, missing data was not an issue.

⁷ The signal detection estimates of c and d' are based on error data, and so the screening of this data is embedded in the error data screening.

Demographic data. The only section of this study where the automated nature of task presentation did not ensure responding was the demographic questionnaire. When answering the demographic questions, participants could press 'ESC' and move to the next question without having filled in a response. However, a review of the data indicated that missing responses on the demographic questionnaire were minimal ($< 5\%$) and so no adjustments were made to the data (Tabachnick & Fidell, 2007).

Of note is the fact that while all participants responded to the question regarding hours of videogames played per week, the responses showed that out of the 146 participants who took part in Study 1, a total of 110 stated that they did not play any videogames at all. While further exploratory analyses were conducted using this variable, the analyses were deemed uninformative and were removed from the main analysis section.

In addition, a problem was encountered with the computer program early on in data collection for Study 1. Specifically, after two weeks of data collection at the OPC, it was discovered that participant age was not being recorded and that one question had been omitted from the MCPRS. The police officers that were affected by this problem were removed from the study and additional officers were obtained from the same pool of participants. In addition, three of the student participants were excluded from the study because of either computer malfunction or because their responses were deemed less than reliable (e.g., the participant was on his cell phone while completing the study).

Outliers.

Shooting data. A total of 4 outliers (determined by having a z-score ± 3.29) were present in the error data. Each of these extreme values was substituted for a value

one standard deviation higher than the next most extreme score in the distribution (Tabachnick & Fidell, 2007). The RT data revealed two participants that were exceptionally quick to respond on one type of trial (e.g., armed Black trials), but no one participant was consistently fast across all trials. Therefore, the RT data were not modified. Timeouts were also examined (i.e., responding slower than 630ms). The minimum number of timeouts for the entire sample was 0 and the maximum was 33. The overall mean number of timeouts across the 80 test trials for the entire sample was 9.43 ($SD = 6.06$), which is consistent with previous research in this area (Correll et al., 2007a; Correll, Wittenbrink, Park, Judd, & Goyle, 2011). Consistent with Correll et al. (2007b), participants who timed out on over half of the trials would have been deleted from the sample, however this never occurred.

Cognitive load and stereotype data. No outliers were found for the cognitive load, IAT, SRS, or MCPRS data. Consistent with Greenwald et al. (2003), IAT trials that were slower than 10,000ms and respondents who were faster than 300ms on 10% or more of their trials would have been removed from the sample. However, no participant met these criteria so the IAT results remained unmodified.

Demographic data. The only outliers found pertaining to demographic data were for participants' hours of videogames watched per week. As mentioned in the previous section, this variable was removed from further analyses.

Normality.

Shooting data. An examination of the grouped error data revealed a moderate positive skew for each group of participants (students = 1.18, recruits = 2.38, officers = 2.54). In addition, an analysis of the error data using Shapiro-Wilk (S-W) tests revealed

significant skewness (all p 's < .001). Given these results, log transformations were completed. Both the original data and the log transformations are reported in summary form throughout the results section for Study 1. However, because no differences were found in the error analyses when using the original and transformed data, the original data were used in all statistical analyses presented here to enhance the interpretation of the results.

An examination of the grouped RT data was conducted using normal Q-Q plots, histograms, normality statistics, and S-W tests. Normality statistics (students = -.46, recruits = -.16, officers = -.47) and S-W tests (all p 's < .001) revealed a moderate negative skew for each group of participants. Consistent with Correll et al. (2007a, 2007b) log transformations were completed on the RT data. Both the original data and the log transformations are reported in summary form. However, only one difference was found in the RT analyses when using the original and transformed data (as indicated by the inclusion of a footnote in the relevant section). So, once again, the original data were used in all statistical analyses presented here.

Cognitive load and stereotype data. According to the S-W tests, both measures of cognitive load were found to be significantly skewed across all levels of experience according to S-W tests (all p 's < .000). Log transformations did little to improve the skewness and so the data remained in its original form. Normality tests of the IAT D scores using S-W tests revealed non-significant results for each group of participants and skewness was found to be minimal (students = -.51, recruits = -.21, officers = .41). The SRS scores revealed two non-significant S-W tests for recruits and officers ($p = .625$, $p = .384$, respectively), however the student group was significant at $p = .024$. An

examination of normal Q-Q plots, histograms, and normality statistics revealed a slight positive skew (.72) for students and log transformations were completed. This transformation improved the skewness for students (.03), but worsened it for recruits (-.36) and officers (-.31). Therefore, it was deemed most appropriate to keep the SRS data in its original form for consistency across participant groups. Responses to the MCPRS showed no pronounced skewness for students (.03), recruits (-.04), or officers (-.06). Non-significant S-W tests confirmed these findings. Similar findings were observed for each individual MCPR sub-scale.

Homogeneity of variance.

Shooting data. Levene's test for equality of error variance was used to examine the error and RT data. An examination of the error data revealed both significant (Black-armed, $p = .02$; Black-unarmed, $p = .03$) and non-significant results (White-armed, $p = .13$; White-unarmed, $p = .91$). However, because the sub-samples (i.e., students, recruits, and officers) were approximately equal in size, one pooled estimate of error can be used across trial types and thus, homogeneity of variance was upheld (Tabachnick & Fidell, 2007). Analyses of the RT data resulted in non-significant tests of equality of error variances for each type of trial (Black-armed, $p = .21$; Black-unarmed, $p = .81$; White-armed, $p = .20$; White-unarmed, $p = .91$).

Cognitive load and stereotype data. An examination of the cognitive load and stereotypes measures resulted in non-significant test results for the data when grouped by experience level (Task difficulty = .11; Mental effort = .72; IAT = .46; SRS = .69; MCPRS total = .08; MCPR external scale = .13; MCPR internal scale = .34). Thus, equal variance was assumed for all stereotype measures.

Main Analyses

Signal detection. Correct and incorrect responses (i.e., excluding timeouts) were used to conduct signal detection analyses. The criterion estimate, c , which assesses the threshold for making a shoot response, was calculated separately for Black and White targets. A sensitivity estimate, d' , or the ability to accurately discriminate armed from unarmed targets, was also calculated for White and Black targets separately. These signal detection estimates were then submitted to separate 3 (Experience: Students vs. Recruits vs. Officers) $\times$ 2 (Race: Black vs. White) mixed-model ANOVAs, with experience being a between-subjects factor and race being a within-subject factor. A summary of the data is provided in Table 1.

Table 1

Means and Standard Deviations of Decision Criterion and Sensitivity Estimates for Study 1

	Students		Recruits		Officers	
	Black	White	Black	White	Black	White
Signal Detection	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Criterion (c)	.08 (.30)	-.04 (.06)	.03 (.26)	-.04 (.05)	.05 (.26)	-.07 (.06)
Sensitivity (d')	2.35 (.98)	2.21 (1.03)	2.73 (.78)	2.45 (1.01)	2.70 (.80)	2.44 (1.05)

Criterion analysis. Placing the criterion to shoot at 0 indicates no greater tendency to make a *shoot* response than a *don't shoot* response (Correll et al., 2007a). Deviations from zero in a positive direction indicate a bias favoring the *don't shoot* response and deviations in the negative direction indicate a *shoot* bias. The analysis of c

revealed a main effect of race, $F(1, 143) = 20.94, p < .001, \eta^2 = .13$, whereby the mean c for Black targets was significantly higher ($M = .06, SD = .27$) than for White targets ($M = -.05, SD = .30$) (see Figure 3). This finding does not support hypothesis 1a. Although a racial bias was expected, it was anticipated that a lower criterion would be set for Black targets than White targets, not the reverse. There was no significant main effect for experience, $F(1, 143) = .75, p = .475, \eta^2 = .01$, or a significant Race x Experience interaction, $F(2, 143) = .54, p = .581, \eta^2 = .01$. These findings do not support hypotheses 1b or 1c, which expected students to set lower shoot criteria than police officers, especially for Black targets.

Figure 3. Decision criterion estimates representing the placement of the shoot/don't shoot criterion for Black and White targets as a function of police experience for Study 1.

Again, in contrast to what was expected in hypothesis 1a, there appears to be a tendency for participants to favour a *shoot* response for White targets, but a *don't shoot* response for Black targets. To examine this bias further, one-sample t-tests were conducted for Black and White targets separately to determine if the mean c 's associated

with these targets differed significantly from 0. An examination of the criterion for Black and White targets revealed that both were significantly different from 0. The criterion for Black targets was significantly above 0, $t(145) = 2.44, p = .016$, 95% CI [.01, .10], indicating a *don't shoot* bias. In contrast, the criterion for White targets was significantly below 0, $t(145) = -3.13, p = .002$, 95% CI [-.03, .13], indicating a *shoot* bias.⁸

Sensitivity analysis. Higher values of d' indicate that participants are able to effectively discriminate between armed and unarmed targets. The analysis of d' indicated that there was a significant effect of race, $F(1, 143) = 7.65, p = .006, \eta^2 = .05$, with sensitivity being higher for Black targets ($M = 2.59, SD = .87$) than White targets ($M = 2.37, SD = .85$) (see Figure 4). In contrast to previous research (Correll et al., 2002, 2007a; Plant & Peruche, 2005), this result indicates that participants were actually better able to distinguish armed from unarmed targets when the target was Black versus White. There was no main effect for experience, $F(1, 143) = 2.22, p = .113, \eta^2 = .03$, and no significant Race x Experience interaction, $F(2, 143) = .29, p = .746, \eta^2 = .00$. These findings do not support hypotheses 1d or 1e, which expected students to be less sensitive than police officers, especially for Black targets.

⁸ Separate analyses of c for each participant group revealed significant differences for the students, recruits, and officers with White targets, $t(49) = -4.64, p < .001$, 95% [-.05, -.02], $t(46) = -6.24, p < .001$, 95% [-.06, -.03], $t(48) = -7.51, p < .001$, 95% [-.08, -.05], respectively. However, only the students had differences on c that approached significance with Black targets $t(49) = 1.98, p = .053$, 95% [.00, .17].

Figure 4. Sensitivity estimates for distinguishing between armed and unarmed Black and White targets as a function of police experience for Study 1.

Reaction time. Reaction times for each participant from all *correct* responses were averaged separately for each type of target (i.e., Black and White) and each type of object (i.e., armed and unarmed). Averages were analyzed using a 3 (Experience: Students vs. Recruits vs. Officers) $\times$ 2 (Race: Black vs. White) $\times$ 2 (Object: Armed vs. Unarmed) mixed-model ANOVA with repeated measures on the latter two factors. A summary of the data is provided in Table 2.

Table 2

Means and Standard Deviations of Reaction Times for Study 1

	Students		Recruits		Officers	
	Black	White	Black	White	Black	White
Reaction Time	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Armed						
Milliseconds	492.56 (35.21)	493.04 (31.55)	488.56 (24.97)	487.06 (24.58)	494.59 (29.17)	494.83 (31.72)
Log Transform	6.20 (.07)	6.20 (.06)	6.19 (.05)	6.19 (.05)	6.20 (.06)	6.20 (.06)
Unarmed						
Milliseconds	526.07 (28.08)	527.80 (27.58)	523.73 (26.48)	528.05 (30.28)	540.55 (28.16)	539.47 (31.25)
Log Transform	6.27 (.05)	6.27 (.05)	6.26 (.05)	6.27 (.06)	6.29 (.05)	6.29 (.06)

There was a significant main effect found for object, $F(1, 143) = 364.80, p < .001$, $\eta^2 = .72$, indicating that participants were faster to *shoot* when targets were armed ($M = 491.84, SD = 29.75$) than to *not shoot* when targets were unarmed ($M = 530.99, SD = 29.18$) (see Figure 5). These results make intuitive sense given that it is arguably easier to press a key (i.e., an active response) to represent a *shoot* decision (i.e., an active response) than to make an active response to represent a *don't shoot* decision (Watt, 2010). There was no main effect of race, $F(1, 143) = .29, p = .593, \eta^2 = .00$.

The between-subjects effect for experience approached significance, $F(1, 143) = 2.44, p = .091, \eta^2 = .03$, although it was not in a direction that supported hypothesis 2a.⁹ That is, further post-hoc analyses revealed that recruits ($M = 506.85, SD = 32.67$) exhibited significantly faster reaction times ($p = .034$) than officers ($M = 517.36, SD = 37.53$), but no significant differences were found between these groups and the students ($M = 509.87, SD = 35.00$).

Figure 5. Reaction times for the type of shooting trial as a function of police experience for Study 1.

The Object x Experience interaction also approached significance, $F(1, 143) = 2.58, p = .079, \eta^2 = .04$. Further examination of the results revealed that the only significant differences observed across experience levels were within the unarmed trials. Specifically, both students and recruits were significantly faster than officers to respond to unarmed targets ($p = .001$), which might be expected given that actively making *don't*

⁹ The between-subject effect of experience no longer approached significance when the log transform data was used in this analysis, $F(2, 143) = 2.20, p = .119, \eta^2 = .03$.

shoot decisions when encountering unarmed targets is likely to be particularly counter-intuitive for officers who have received large amounts of use of force training.

The Race x Object interaction was not significant, $F(1, 143) = .54, p = .463, \eta^2 < .01$, indicating that armed Black targets were not *shot* quicker than armed White targets (and that unarmed White targets were not, *not shot* quicker than unarmed Black targets). Thus, hypothesis 2b was not supported. Similarly, the Race x Experience interaction was not significant, $F(2, 143) = .19, p = .828, \eta^2 < .01$, and the Race x Object x Experience interaction was not significant, $F(2, 143) = .63, p = .532, \eta^2 = .01$, thus not supporting hypothesis 2c.

Error rates. Errors were calculated for each participant and error rates (i.e., mistakes/total-timeouts) were calculated for each type of target (i.e., Black and White) and object (i.e., armed and unarmed). The mean percentage of incorrect responses for the entire sample was 11.15% and the mean number of timeouts was 11.79. These rates are consistent with previous research where a 630ms response window was used (Correll et al., 2007a, 2011). A summary of the data is provided in Table 3.

Table 3

Means and Standard Deviations of Error Rates for Study 1

	Students		Recruits		Officers	
	Black	White	Black	White	Black	White
Error Rates	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Armed						
Error Rates	.17 (.15)	.16 (.14)	.11 (.10)	.09 (.09)	.11 (.11)	.10 (.10)
Log Transform	.15 (.12)	.14 (.11)	.10 (.09)	.09 (.08)	.10 (.09)	.10 (.09)
Unarmed						
Error Rates	.13 (.13)	.17 (.13)	.10 (.10)	.15 (.13)	.10 (.11)	.15 (.14)
Log Transform	.12 (.11)	.15 (.11)	.09 (.09)	.13 (.10)	.09 (.09)	.14 (.12)

Participants' error rates were subjected to a 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) x 2 (Object: Armed vs. Unarmed) mixed-model ANOVA with repeated measures on the latter two factors. There was a significant effect found for race, $F(1, 143) = 6.57, p = .011, \eta^2 = .04$, but not for object, $F(1, 143) = .94, p = .335, \eta^2 = .01$. Participants made more errors on trials involving White targets ($M = .14, SD = .13$) than Black targets ($M = .12, SD = .12$) (see Figure 6). The between-subject effect of experience was also significant, $F(2, 143) = 3.48, p = .034, \eta^2 = .05$, thus supporting hypothesis 3a. Further analysis revealed that students ($M = .16, SD = .14$) had significantly higher error rates than both recruits ($M = .11, SD = .11$) and officers ($M = .12, SD = .12$), although recruits and officers did not differ from each other.

Figure 6. Error rates for the type of shooting trial as a function of police experience for Study 1.

The Race x Object interaction was also significant, $F(1, 143) = 17.72, p < .001, \eta^2 = .11$ (see Figure 7). Further examination of the results revealed that significant differences in errors existed for unarmed trials, but not armed trials. However, while the pattern of results was consistent with previous analyses, the pattern was inconsistent with the expectation described in hypothesis 3b. Rather than showing a bias towards Black targets, participants made significantly more errors ($p < .001$) on trials involving unarmed White targets ($M = .16, SD = .13$) than unarmed Black targets ($M = .11, SD = .12$).

Figure 7. Error rates for object type as a function of target race for Study 1.

The Object x Experience, $F(2, 143) = 1.62, p = .200, \eta^2 = .02$, Race x Experience, $F(2, 143) = .22, p = .800, \eta^2 = .00$, and Race x Object x Experience, $F(2, 143) = .13, p = .878, \eta^2 < .00$, interactions were all non-significant. Thus, hypothesis 3c was not supported. That is, racial bias with respect to error rates did not decrease as participants' police experience increased.

Preliminary analyses of cognitive load and stereotype measures. In an attempt to shed some light on the shooting results, the cognitive load data, the implicit and explicit stereotype measures, the frequency and valence of participant interactions with Black and White individuals, and the MCPRS findings were examined. Before investigating the degree to which each of these measures correlate with outcome data from the shooting task, the extent to which differences exist across participant groups with respect to each measure was examined. The relevant data for these analyses are presented in Table 4.

Table 4

Means and Standard Deviations of Cognitive Load Items and Stereotype Measures for Study 1

	Students	Recruits	Officers
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Cognitive Load Items			
Perceived Difficulty (/9)	6.14 (2.10)	5.85 (1.63)	6.59 (1.32)
Mental Effort Expended (/9)	6.76 (1.89)	6.74 (1.66)	6.69 (1.53)
Stereotype Measures			
IAT (D)	.30 (.35)	.57 (.40)	.59 (.45)
SRS (/31)	16.74 (3.72)	16.62 (2.98)	16.67 (3.25)
Adjective Checklist			
Cultural Black Stereotype (/18)	11.38 (3.82)	7.77 (5.17)	6.53 (4.85)
Cultural White Stereotype (/18)	7.32 (4.08)	6.38 (5.12)	6.73 (5.30)
Personal Black Beliefs (/18)	5.54 (3.78)	2.83 (3.39)	2.22 (2.88)
Personal White Beliefs (/18)	5.94 (4.23)	3.77 (4.35)	3.51 (4.15)
Interpersonal Interactions			
Frequency with Blacks (/5)	3.36 (1.10)	3.45 (.85)	2.98 (1.01)
Frequency with Whites (/5)	4.38 (.92)	4.64 (.70)	4.63 (.60)
Valence with Blacks (/5)	3.76 (.85)	3.87 (.80)	3.86 (.82)
Valence with Whites (/5)	3.78 (.93)	3.85 (.78)	3.80 (.82)
Motivation to Control Prejudice			
External Sub-scale (/45)	30.84 (6.65)	31.04 (5.07)	29.92 (6.51)
Internal Sub-scale (/40)	22.48 (3.89)	24.17 (3.47)	23.78 (4.31)
Total Scale (/85)	53.32 (8.15)	55.21 (6.18)	53.69 (8.67)

Cognitive load measures. The cognitive load data were examined to test hypothesis 4a, which states that participants with more police experience will report lower levels of cognitive load during the shooting task. However, when the perceived difficulty of the task was examined using a one-way ANOVA, no significant differences were found across the experience groups, $F(2, 143) = 2.28, p = .106, \eta^2 = .03$. Likewise, when the amount of effort expended during the task was examined, no differences were found across the groups, $F(2, 143) = .02, p = .980, \eta^2 = .01$.

Implicit association test. Recall that D scores can range between +/- 2. More positive scores indicate an implicit association between the concepts of Black-bad and White-good, whereas more negative scores indicate an implicit association between Black-good and White-bad. The typical range for D tends to fall between .30 and .90 (e.g., IAT Corp., 2010).

The average D score across all experience levels was .48 ($SD = .43$, range -.72 to 1.76). These results show a moderate implicit association between the concepts of Black and bad (i.e., a moderate negative Black bias). However, a one-way ANOVA indicated that IAT scores differ significantly across the groups, $F(2, 143) = 8.25, p < .001, \eta^2 = .10$. As illustrated in Table 4, and as confirmed by post-hoc analyses, students had significantly lower scores on the IAT (i.e., less of a negative Black bias) than recruits and officers ($p < .001$). The IAT scores for recruits and officers did not significantly differ from each other.

Symbolic racism scale. Scores on the SRS can range from 8-31 (higher scores indicating higher levels of racism towards Black individuals). A Cronbach's α of .55 was obtained for responses, indicating a slightly low level of internal consistency (Henry &

Sears, 2002). As illustrated in Table 4, all groups had what appears to be a moderate degree of racism. The mean across groups was 16.68 ($SD = 3.32$), which is consistent with previous research (e.g., 13.67, Unnever & Cullen, 2007; 20.20, Vander Veen, 2000). No significant differences existed between the students, recruits, or officers with respect to their SRS scores, $F(2, 143) = .02, p = .984, \eta^2 = .01$.

Adjective checklist. Recall that participants were asked to highlight adjectives from a prescribed list of 18 adjectives (e.g., violent, dangerous, etc.) that they felt characterized: (a) a cultural stereotype of Black and White individuals, and (b) their own personal stereotype of Black and White individuals. Before presenting the results from the analyses, it should be noted that there was overwhelming negative feedback from participants, especially the police officers, about the use of the adjective checklist. Although numerous issues were raised, two seemed particularly problematic for the participants. One issue was that participants felt uncomfortable (even unable) to indicate how “someone else feels” about Black and White people, making it difficult for them to judge cultural stereotypes. The second issue was that participants felt it was unfair to select adjectives because they felt they were over-generalizing (i.e., many exclaimed that they knew both White and Black individuals that possessed or did not possess the adjective listed). Despite these concerns, the data from the adjective checklists were examined.

The data related to cultural stereotypes was submitted to a 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) mixed-model ANOVA. There was a significant effect found for race, $F(1, 143) = 24.25, p < .001, \eta^2 = .15$. Participants selected more negative adjectives to represent Black cultural stereotypes (M

= 8.56, $SD = 5.05$) than White cultural stereotypes ($M = 6.81$, $SD = 4.84$). The between-subject effect of experience was also significant, $F(2, 143) = 5.87$, $p = .004$, $\eta^2 = .08$. Post-hoc analyses indicated that students ($M = 9.35$, $SD = 4.43$) selected significantly more negative adjectives overall ($p < .001$) than recruits ($M = 7.07$, $SD = 5.16$) and officers ($M = 6.63$, $SD = 5.06$), although recruits and officers did not differ from each other. Lastly, the Race x Experience interaction was significant, $F(2, 143) = 12.54$, $p < .001$, $\eta^2 = .15$. Further examination revealed that significant differences were found for Black cultural stereotypes, whereby students endorsed more negative stereotypes ($p < .001$) than recruits and officers (although the latter two groups did not differ at $p = .194$), but there were no differences between groups for White cultural stereotypes.

The data related to personal stereotypes was also submitted to a 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) mixed-model ANOVA. There was a significant effect found for race, $F(1, 143) = 10.02$, $p = .002$, $\eta^2 = .07$. Interestingly, participants selected more negative adjectives to represent White personal stereotypes ($M = 4.41$, $SD = 4.36$) than Black personal stereotypes ($M = 3.53$, $SD = 3.65$). This is consistent with the previous shooting data, which indicated a negative White bias. The between-subject effect of experience was also significant, $F(2, 143) = 9.96$, $p < .001$, $\eta^2 = .12$. Post-hoc analyses indicated that students ($M = 5.74$, $SD = 4.00$) selected significantly more negative adjectives overall ($p < .001$) than recruits ($M = 3.30$, $SD = 3.91$) and officers ($M = 2.87$, $SD = 3.61$), although recruits and officers did not differ from each other. The Race x Experience interaction was not significant, $F(2, 143) = .89$, $p = .414$, $\eta^2 = .01$.

Frequency and valence of interpersonal interactions. Next, the frequency and valence of participants' interactions with Black and White individuals were examined. Frequency scores were submitted to a 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) mixed-model ANOVA. There was a significant effect found for race, $F(1, 143) = 152.28, p < .001, \eta^2 = .52$. Participants engaged in significantly more interactions with White individuals ($M = 4.55, SD = .76$) than Black individuals ($M = 3.26, SD = 1.01$). The between-subject effect of experience was not significant, $F(2, 143) = 1.85, p = .161, \eta^2 = .03$, but the Race x Experience interaction was, $F(2, 143) = 3.32, p = .039, \eta^2 = .04$. Further examination of this interaction revealed that significant differences were found for the frequency of interactions with Black individuals, whereby officers had fewer interactions with Blacks than recruits ($p = .023$), but neither group differed from students. However, the groups did not differ in terms of their frequency of interactions with White individuals.

Of potentially more interest was the valence scores participants assigned to their interactions' with Black and White individuals. Again, these valence scores were submitted to a 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) mixed-model ANOVA. There was no significant effect found for race, $F(1, 143) = .10, p = .753, \eta^2 = .00$, or experience, $F(2, 143) = .20, p = .822, \eta^2 = .00$, and no significant Race x Experience interaction, $F(2, 143) = .13, p = .879, \eta^2 = .00$.

Motivation to control prejudiced reactions scale. Recall that the MCPRS is comprised of two scales: (1) the extrinsic concern about appearing prejudice scale, which has a possible range of 9-45, and (2) the internal restraint to avoid dispute scale, which has a possible range of 8-40. The overall score on the MCPRS can range from 17-85.

Cronbach's alpha for the external scale was .74 indicating satisfactory internal consistency. The alpha level of the internal scale was much lower, at .37, and the alpha for the overall scale was .65.

The mean external sub-scale score for all participants was 30.60 ($SD = 6.11$) and, as indicated in Table 4, there were only small, non-significant differences between students, recruits, and officers, $F(2, 143) = .46, p = .630, \eta^2 = .01$. The mean internal sub-scale score for all participants was 23.46 ($SD = 3.95$). Again, there were only small, non-significant difference between students, recruits, and officers, $F(2, 143) = 2.50, p = .085, \eta^2 = .03$. The scores for these sub-scales were consistent with some previous Canadian research (e.g., $M = 31.0, SD = 5.6$; $M = 23.32, SD = 4.4$, respectively; Nesdole, 2009).

The overall MCPRS score for all participants was 54.05 ($SD = 7.75$). No differences were found between students, recruits, and officers, $F(2, 143) = .80, p = .451, \eta^2 = .01$. To compare our participants with those from previous research, scores for each item were summed and averaged across the number of items. This results in a mean item score of 3.18 ($SD = .46$) out of a possible 5. This mean is similar to results from other research with MCPRS means reported (e.g., 3.68, Gawronski, Geschke, & Banse, 2003).

Correlational and moderator analyses. In this section, the cognitive load and stereotype data were examined to determine the extent to which there is a relationship between these data and the shooting data. In the first part of this section, simple correlations are examined. Following this, the results from various analyses will be presented to determine if motivation to control prejudice moderates the relationship between some of the stereotype measures and shooting performance. A summary of the results is provided in Table 5.

Table 5

Pearson Correlations between Cognitive Load Items, Stereotype Measures, Demographics, and Criterion, Sensitivity, and Reaction Time Biases for Study 1

	Criterion White Bias			Sensitivity White Bias			RT White Bias		
	Students	Recruits	Officers	Students	Recruits	Officers	Students	Recruits	Officers
Cognitive Load Items									
Perceived Difficulty	-.02	.00	.03	-.03	.11	.17	-.10	-.08	-.08
Mental Effort Expended	-.02	-.37*	-.05	-.22	.03	.20	.02	.00	-.10
Stereotype Measures									
IAT (D)	-.03	.20	.10	-.04	-.04	.07	.09	.16	.19
SRS	.27	-.26	-.20	.05	-.05	.08	-.08	-.23	-.19
Adjective Checklist									
Cultural Black Stereotype	-.17	.16	.13	-.20	-.20	.09	.02	.13	-.11
Cultural White Stereotype	-.09	.24	-.05	-.24	.04	.16	.02	.06	-.09
Personal Black Beliefs	.04	.20	.19	.11	-.24	-.06	.03	.18	.02
Personal White Beliefs	-.05	.28	.06	-.01	-.07	-.06	-.06	.09	-.12

Interpersonal Interactions									
Frequency with Blacks	-.04	-.01	.25	-.25	-.15	-.11	-.08	.02	-.06
Frequency with Whites	-.14	-.12	-.37**	.15	-.19	-.19	.34*	-.08	.06
Valence with Blacks	-.21	.07	-.08	-.12	-.36*	-.30*	.03	.21	-.05
Valence with Whites	-.27	-.09	.12	.14	-.21	-.26	.19	.25	-.04
Motivation to Control Prejudice									
External Sub-scale	-.12	.03	-.03	-.11	-.17	.29*	-.06	.15	.05
Internal Sub-scale	-.11	.21	.03	.07	.21	.16	.064	-.04	-.16
Total Scale	-.15	.15	-.01	-.05	-.03	.30*	-.02	.10	-.04
Demographics									
Age	-.21	-.15	-.25	-.02	.26	-.31*	-.16	-.14	.02
Gender	-.25	-.06	.11	-.08	-.16	.06	-.08	-.25	-.16
Minority	-.20	.18	-.17	.12	-.19	.02	-.08	-.10	.26
Education Level	-.01	-.08	-.01	.08	-.28	.24	-.04	.04	.24

Note. * = $p < .05$; ** = $p < .001$; point-biserial correlations were used for the gender and minority variables.

Although hypothesis 5a anticipated positive correlations between Black stereotype measures (e.g., personal stereotypes towards Blacks as measured using the adjective checklist) and a Black shooting bias (e.g., with respect to reactions times), it makes more sense, given the shooting results, to examine how the various stereotype measures relate to a White shooting bias (see below for more details regarding the various indices that will be calculated). Thus, in contrast to hypothesis 5a, it is now expected that the Black stereotype measures will negatively correlate with the various indices that will be calculated to reflect the White shooting bias and that the White stereotype measures (e.g., personal stereotypes towards Whites) will positively correlate with the White racial bias indices.

Following the logic used by Correll et al. (2007b), the White racial bias indices that will be used in the correlational (and moderator) analyses were calculated as follows: the index for the criterion, c , was calculated as $c_{\text{Black}} - c_{\text{White}}$, the index for sensitivity, d' , was calculated as $d'_{\text{Black}} - d'_{\text{White}}$, and the index for RTs was calculated as $(RT_{\text{unarmed White}} - RT_{\text{unarmed Black}}) + (RT_{\text{armed Black}} - RT_{\text{armed White}})$. It was unnecessary to include an index for error rates, as this index is essentially encompassed by the signal detection indices that are based on correct and incorrect responses. For each of the indices described above, higher values represent a greater racial bias towards *White* targets.

As indicated in Table 5, the correlational analyses revealed only eight significant correlations (out of a possible 171) at the level of $p < .05$. Specific to the hypotheses, it was believed that the cognitive load measures would be positively correlated with automatic responding, as measured by criterion estimates (hypothesis 4b). This was not

found to be the case. Similarly, it was believed that the cognitive load measures would be negatively correlated with controlled responding, as measured by sensitivity estimates (hypothesis 4c). Again, this was not supported by the correlational analyses. Lastly, no support was found for the revised hypotheses related to the various stereotype measures and the White racial bias indices. That is, the Black stereotype measures were not significantly correlated with the White racial bias indices in a negative direction, nor were the White stereotype measures significantly correlated with the White racial bias indices in a positive direction. As discussed by Correll et al. (2007b), while it is tempting to read something into the few correlations that were significant, they do not appear to follow a particularly meaningful pattern and are most likely random in nature or an artifact of sampling error. This is consistent with previous research, where no strong correlations were found between stereotype measures and the weapon identification task (Payne, 2001) or shooting behaviours (Correll et al. 2002, 2007a).

Despite not finding significant correlations between stereotype measures and racial bias indices, moderator analyses were still conducted to determine if participants' motivation to control their prejudiced reactions was resulting in the lack of significant relationships in Table 5. Specifically, participants' MCPRS scores were examined to determine whether these scores moderate the relationships between the relevant explicit measures (i.e., SRS and Black personal responses of the adjective checklist) and racial bias (i.e., c , d' , and RT). However, because the items on the MCPRS deal directly with one's motivation to control prejudiced reactions towards Black individuals, the racial bias indices described above (and included in Table 5) had to be re-calculated so that higher scores reflected a Black bias. The formulas for doing this were outlined by Correll et al.

(2007b) and are as follows, for c , d' , and RT, respectively: $c_{\text{White}} - c_{\text{Black}}$, $d'_{\text{White}} - d'_{\text{Black}}$, and $(\text{RT}_{\text{unarmed Black}} - \text{RT}_{\text{unarmed White}}) + (\text{RT}_{\text{armed White}} - \text{RT}_{\text{armed Black}})$.

Because participants' MCPRS scores are continuous in nature, moderated hierarchical regression was the most appropriate analysis, as this procedure maintains the greatest degree of statistical power (Bauer, Preacher, & Gil, 2006; Cohen & Cohen, 1983; Evans, 1991). The procedure involved several steps. First, focusing on the SRS, the SRS predictor and the MCPRS moderator were standardized into z-scores.¹⁰ Next, the predictor and moderator were then regressed separately for each of the three racial indices (c , d' , RT). Finally, the interaction term (SRS*MCPRS) was regressed on these indices. The size of the R^2_{change} is an indicator of the size of the moderator effect. In contrast to hypothesis 5b, the results showed that the MCPRS score was not a significant moderator for any of the three racial bias measures (c : $\beta = .04$, $t(142) = 1.14$, $p = .256$, $R^2_{\text{change}} = .009$; d' : $\beta = -.07$, $t(142) = -.04$, $p = .966$, $R^2_{\text{change}} = .000$; RT: $\beta = .11$, $t(142) = .04$, $p = .970$, $R^2_{\text{change}} = .000$).

This same procedure was then used to examine the possibility of MCPRS scores moderating the relationship between the Black personal responses on the adjective checklist and the racial bias measures. Once again, the analyses did not support hypothesis 5b. The MCPRS scores were not a significant moderator for any of the three racial bias measures (c : $\beta = -.06$, $t(142) = -1.62$, $p = .108$, $R^2_{\text{change}} = .018$; d' : $\beta = .04$, $t(142) = .54$, $p = .591$, $R^2_{\text{change}} = .002$; RT: $\beta = 1.67$, $t(142) = .59$, $p = .559$, $R^2_{\text{change}} = .002$).

¹⁰ Variables were examined for multicollinearity concerns. The tolerance value was .97 and the average variance inflation factor was 1.03. These scores highlight the potential for multicollinearity to be a problem (Field, 2005).

These results, while not supportive of hypothesis 5b, were not entirely unexpected. The sample in this study did not display a significant Black bias and thus, their motivation to control such a bias would unlikely moderate the relationship between the Black stereotype measures and their shooting performance. Interestingly, other researchers have also failed to find a significant MCPRS moderating effect, even when their samples did have a pronounced Black bias (e.g., Correll et al., 2002; Glaser & Knowles, 2008).

Discussion

The primary goal in Study 1 was to determine whether one's performance on a simulated shooting task, with respect to the degree of racial bias exhibited in shoot/don't shoot decisions, was influenced by one's level of police experience. It was expected that those with more police experience would display less racial bias and be more accurate in their shooting decisions. A secondary goal of this study was to determine how a range of measures relate to shooting performance in a race-based shooting task. The measures included assessments of task-related cognitive load, explicit and implicit stereotypes, the frequency and nature of interpersonal interactions with Black and White individuals, and one's motivation to control prejudiced reactions (towards Black individuals).

Explanations of Shooting Performance Results

Signal detection. Although hypothesis 1a was that participants would set a more lenient shoot criterion for Black versus White targets, the participants were significantly more "trigger happy" when exposed to White targets, presumably reflecting the automatic activation of a danger stereotype when faced with these suspects. Interestingly, hypothesis 1b and 1c were also not supported. Police experience had no effect on this

bias and each of the experience-based groups, for both Black and White targets, set relatively similar shooting thresholds.

The analyses of sensitivity estimates, which represents the degree to which controlled processing was being used, showed an effect of target race. Surprisingly, the participants were able to distinguish between armed and unarmed targets when the targets were Black versus White. Despite what we expected, there was no effect of experience on the sensitivity estimates (in contrast to hypothesis 1d) and no Race x Experience interaction (in contrast to hypothesis 1e). Thus, it appears on the basis of our results that students, recruits, and officers were equally able to use controlled processing to distinguish between armed and unarmed targets; however they were all significantly better at doing so for Black targets.

These findings beg certain questions: Why did participants exhibit a White, as opposed to a Black shooting bias? And why did participants with more police experience not exhibit less racial bias than those without such experience.

This White shooting bias directly contradicts previous shooting research in the U.S., which has consistently found evidence for a strong Black bias (e.g., Correll et al., 2002, 2007a; Plant & Peruche, 2005; Plant et al., 2005; Watt, 2010). These signal detection finding suggests that there may be cultural differences in the types of stereotypes that are activated when people are required to make (mock) split-second shooting decisions, whereby Americans view Blacks as more dangerous than Whites under these circumstances, but the reverse is true in Canada. It is also possible, however, that other explanations exist, such as the fact that the participants' *a priori* knowledge of this study being about race, or the specific instructions provided to participants, could

have influenced their responses. For example, while it seems unlikely given the very short response window, participants in the current study (who might have anticipated that a Black bias was hypothesized) may have overcompensated for their negative Black stereotypes, essentially making it appear as if they possess a White bias (e.g., see Fitzgerald et al., 2011).

The lack of an experience effect also contradicts some previous research (e.g., Correll et al., 2007a). Despite the fact that the experimental stimuli used in the current study was similar to that used in previous research, one possible explanation for these findings relates to the relatively low level of ecological validity that characterizes the current study. Sharps (2010) has commented on the challenges of creating valid shoot/don't shoot stimuli in highly controlled experimental environments, not to mention the troubles with simulating the emotional component of genuine use of force encounters. It is of course possible, and perhaps very likely, that two-dimensional photos of non-moving targets are not sufficiently valid to capture the differences in shooting behavior that might actually exist between students and police professionals. This might be especially true when the targets in the photos are holding objects in awkward and sometimes non-threatening positions (e.g., pointing a gun up in the air).

If, as argued previously, the predicted superiority of police officers is due to the fact that they possess useful shooting schemas, acquired through actual street experience or high fidelity training, then simulated shooting scenarios that do not capture the realities of these real-world experiences may lack the cues necessary to activate these schemas (Paas, 1992). In essence, the lack of realism in the current shooting scenarios may make the shooting task a novel experience for both students *and* police officers, rendering any

existing schemas irrelevant (essentially turning those participants with police experience into relative novices). With their existing shooting schemas rendered irrelevant, these experienced participants would be unable to rely on controlled processing when making shooting decisions (i.e., efficiently scanning scenes for the presence of weapons; as estimated using d') and may instead rely more on automatic racial stereotypes (as estimated using c).

In fact, some of the post-study feedback received from the participants confirms this line of thinking. The lack of realism associated with the shooting scenarios was rarely, if ever, raised by the students, however, it was frequently raised by the police participants. For example, feedback from many of the officers revealed that if they had encountered the armed targets (as shown in the simulated scenarios) in actual real-world scenarios, they would not have felt justified in firing their weapon (as was asked of them in this study). Indeed, many officers stated that they viewed the armed targets as non-threatening because of the way the target was holding his weapon (e.g., pointing the gun down, up, or to the side, rather than directly at the participant). In short, there appeared to be an obvious mismatch between the officers' schema of lethal force encounters and what was being asked of them in the study.

Reaction time. Unlike the signal detection results, reaction times were not affected by target race. Also, hypothesis 2a was not supported by the main effect of experience approaching significance (as it was recruits that were significantly faster than officers). There was no evidence for the predicted interaction between race and object as described in hypothesis 2b. In the past, participants have tended to respond faster to armed Black targets and unarmed White targets, which represent traditionally defined

danger stereotypes (e.g., Correll et al., 2002, 2007a). However, that was clearly not the case in the present study, presumably because the current participants (based on the signal detection and shooting error results) do not perceive these stimuli in the same fashion. Indeed, if anything, participants found it easier to respond to armed White targets and unarmed Black targets than the reverse.

Interestingly, hypothesis 2c was not supported. It was anticipated that a reaction time racial bias would decrease as a function of police experience. Instead, a strong, near significant trend was found for police experience, which indicated that police officers performed worse, not better, than the other participant groups. The officers were substantially slower than recruits to make correct shooting decisions, and quite a bit slower than students. Given some of the other results that emerged from this study, which reflect superior performance on the part of police officers, a general lack of motivation or attention does not seem to be a likely explanation for the slower reaction times. Rather, this finding may have to do with the fact that the police officers in this study were significantly older than the other two groups of participants. Reaction times in complex decision making tasks, such as the shooting task studied here, are known to slow throughout adulthood (e.g., Der & Deary, 2006). The near significant, positive correlation between participant age and average reaction times in this study lends some limited support to this explanation ($r = .14, p = .089$).

Also of interest is another set of findings that emerged when participants' reaction times were analyzed – a highly significant effect for the type of object that the targets were holding and a near significant interaction between object and experience. Consistent with previous research, participants in this study were significantly faster to shoot when

targets were armed than to not shoot when targets were unarmed (e.g., Correll et al., 2002, 2007a; Watt, 2010; Yoshida, 2009). And, for some reason, police officers were particularly slow to respond correctly when targets were unarmed.

Although no specific literature was found to explain this set of findings, apart from evolutionary research suggesting that people should respond faster when faced with a threat (e.g., Panksepp, 1998; Rolls, 1999), these results make intuitive sense. Presumably, it is easier (cognitively speaking) to make an active response (i.e., tapping a computer key) to initiate an action (i.e., shooting the target) than it is to make an active response (i.e., tapping a computer key) to initiate a lack of action (i.e., not shooting the target). For police officers who are sometimes trained to do nothing (i.e., keep their weapons holstered) to initiate a lack of action (i.e., not shooting a target), being asked to make an active response to initiate a no shoot decision may be a particularly difficult task.

Error rates. Unlike the other outcome measures, the analysis of error rates showed a significant effect of police experience, which supported hypothesis 3a. That is, those with less police experience (i.e., students) were found to make more shooting errors than those with more police experience (i.e., recruits, officers). Although hypothesized, given the lack of significant experience effects for the other outcome measures (in the expected direction) this finding is somewhat difficult to explain.

Arguably of more interest is that all participants made significantly more errors for White targets compared to Black targets and that a significant interaction emerged between race and object. In direct opposition to hypothesis 3b, participants made more errors when exposed to unarmed White targets compared to unarmed Black targets (no

significant differences emerged across armed targets, though there was a slight tendency for participants to make more errors when exposed to armed Black targets compared to armed White targets). Interestingly, hypothesis 3c was also not supported, as this racial bias did not decrease as a function of police experience.

As discussed previously, these results suggest that participants in the current study were relying more on automatic activated stereotypes, rather than making controlled responses based on careful scans of the scene (to identify the presence of weapons). While these findings are consistent with the other results emerging from this study, they differ drastically from previous U.S. research where clear Black biases are reported (e.g., Correll et al., 2002, 2007a; Watt, 2010). Perhaps, as discussed in the literature review, there are real differences between U.S. and Canadian samples when it comes to the knowledge of, or endorsement for, racial stereotypes. Of course, as already stated, it is also possible that the instructions provided to participants, which indicated that the study was examining the impact of race on shooting decisions, interfered with participant responses. This potential explanation will be explored in more detail below.

Cognitive load ratings and stereotype measures. While hypothesis 4a stated that those participants with more police experience would experience less cognitive load when making shooting decisions, this was found not to be the case. Participants from each of the experience-based groups appeared to see the shooting task as equally difficult and each group of participants indicated that they exerted a similar amount of mental effort during the shooting task. As was the case with the outcome measures from the shooting task, hypothesis 4a was based on the view that experienced police officers would possess shooting schemas that would essentially make the shooting task easier for

them (i.e., require less cognitive resources). Given what has already been presented about the degree of realism associated with the shooting task, it is perhaps not surprising that no between-group differences were found with respect to cognitive load (see Kalyuga, Chandler, & Sweller, 1999). Interestingly, although it was expected that the cognitive load measures would positively correlate with automatic responding (hypothesis 4b) and negatively correlate with controlled responding (hypothesis 4c), this was also not found to be the case (with one exception).

A range of explicit and implicit stereotypes measures were also collected and each was correlated with indices reflecting the White shooting bias. As indicated in hypothesis 5a and 5b, it was hoped that this information would help clarify the nature of the shooting bias, but this was not the case. For example, despite the fact that the shooting measures generally revealed a negative White bias, participants' scores on the IAT demonstrated a moderate Black bias. Given these race-IAT findings, it was not surprising that IAT scores did not correlate significantly with racial bias on the shooting task, but it is rather surprising that two implicit measures reveal quite different biases amongst our participants. Interestingly, it is not uncommon to find low (or no) correlations between implicit measures (e.g., Bosson, Swann, & Pennebaker, 2000; Brauer, Wasel, & Niedenthal, 2000; Fazio & Olson, 2003). Often these findings are attributed to issues of reliability or measurement error. In the current study, an additional problem may be that the constructs used in the race-IAT (i.e., are Black and White good or bad) are sufficiently different from the constructs that are relevant in a race-based shooting task (e.g., are Blacks and Whites dangerous or safe).

One of the explicit stereotype measures, the SRS, also showed a moderate level of symbolic racism towards Black individuals, but did not correlate significantly with racial bias on the shooting task. Given the extent to which socially desirable responding is a problem on explicit measures of racism, this finding was not unexpected. However, the other explicit measure of racial stereotypes examined in this study, the adjectives checklist, did provide some interesting results. For example, consistent with research from the U.S., participants endorsed a more negative stereotype to Black (versus White) individuals when asked about cultural stereotypes. However, in contrast to U.S. research, participants assigned fewer negative adjectives to Black (versus White) individuals when asked about their personal stereotypes. Unfortunately, neither cultural stereotypes, nor personal stereotypes correlated significantly with the White shooting bias that was found, but these findings may relate to important differences between Canadian and American participants that should be examined more thoroughly in the future.

Lastly, it was hypothesized that MCPRS scores would moderate the relationship between explicit stereotype measures and levels of racial bias on the shooting task. Consistent with some previous research, this was not found to be the case (e.g., Correll et al., 2002; Glaser & Knowles, 2008). One issue with this analysis is that responses on the MCPRS can be impacted by socially desirable responding. Thus, in the future an attempt should be made to rely on implicit measures of motivation to control prejudice that may be more resistant to social desirability effects (e.g., the Implicit Motivation to Control Prejudice Scale; Glaser & Knowles, 2008).

Potential Explanations for a White (not Black) Bias

Beyond the finding that police experience does not decrease racial biases in the way that was predicted, the major finding to emerge from the current study is that the typical Black shooting bias that has been found in U.S. research was not found here. Instead, an unexpected, relatively strong White bias was found across most of the shooting measures. It is not entirely clear why a White shooting bias emerged, or even if this finding is stable (i.e., replicable), but two plausible explanations are: (1) Canadians do not possess the same racial stereotypes as Americans when faced with a task requiring split-second shooting decisions, and/or (2) methodological issues with this study resulted in the White bias.

A Canadian versus American sample. It is possible that the White shooting bias found in this study resulted from the fact that Canadian, rather than American, participants were sampled.¹¹ While other differences (beyond nationality) might exist between our Canadian samples and the American samples tested in studies by Correll et al. (2002, 2007a, 2010), Plant and Peruche (2005), and Plant et al. (2005), the difference in nationality is clearly the one distinguishing factor that stands out.

What evidence is there to support the view that the nationality of our participants explains the absence of traditional Black shooting biases? One line of evidence relates to the findings just discussed. Specifically, participants did not always show clear signs that they possess very strong negative stereotypes towards Black individuals. For example, they scored in the moderate range on the race-IAT and the SRS; they assigned more negative adjectives to Whites compared to Blacks when describing their personal

¹¹ The student body at Carleton does in fact consist primarily of Canadians (Carleton University, 2011), as does the OPC (Ontario Police College, 2011).

stereotypes; and they rated their interactions with Blacks as being equally positive when compared to their interactions with Whites. Of course, it also must be said that while the participants did not always reveal strong negative stereotypes towards Blacks, the stereotype measures did not reveal any clear signs of strong negative stereotypes towards White individuals either.

A second line of evidence comes from the examination of Canadian research, which is unrelated to shooting decisions, but stand in contrast to the results of U.S. research. For example, consider jury decision-making research in the U.S., which has frequently examined the impact of defendant race (e.g., on verdict decisions) and finds consistent evidence for a strong Black bias (e.g., Mitchell et al., 2005; Sommers & Ellsworth, 2001). As discussed in the literature review, while a small amount of Canadian research has found a similar Black bias (e.g., Schuller et al., 2009), the majority of Canadian research has failed to do so. For example, Lant et al. (2011), who relied on a sample from Ontario to examine the effect of race on perceptions of defendant culpability in pretrial publicity, found no significant bias towards Black defendants. As already indicated, similar results were reported by Maeder and Saliba (2011) and some Canadian research has even uncovered an “overcorrection effect”, whereby participants are actually more favourable towards Black, compared to White, defendants (e.g., Fitzgerald et al., 2011).

Given all of this information, it may be premature to assume, as many people do, that Canadians possess strong negative stereotypes towards Black people in the same way that Americans. Indeed, cultural differences between the two countries may result in

substantial differences in research findings with respect to race effects on shooting decisions.

Participant instructions for the shooting task. In addition to potential cultural effects, another possible explanation for why the results from the current study differ from those reported in the U.S. relates to a methodological issue. Specifically, the methods used in Study 1 were almost identical to those used by Correll et al. (2002, 2007a), with one notable exception – participants in the current study knew the study was examining issues of race.¹² While participants in Correll et al.’s study would presumably work out that their study was about race, Correll and his colleagues simply outlined their study to participants as an investigation of one’s ability to monitor and quickly respond to a variety of stimuli on a computer; they did not explicitly mention race in their instructions (e.g., Correll et al., 2002).

In the current study, participants were explicitly informed that they would be required to make shoot/don’t shoot decisions when exposed to Black and White targets. Therefore, it is possible that participants’ knowledge that race was the primary factor under investigation in the current study somehow influenced their responses. For instance, the participants could have been concerned with appearing racist against Black targets and they may have overcompensated for this when making shooting decisions (similar to the overcorrection effect found by Fitzgerald et al., 2011). While it seems unlikely that this is an issue given the extremely short response window that participants had to make shooting decisions, this type of explanation can potentially be supported by the aversive racism literature (Dovidio et al., 2010; Gaertner & Dovidio, 1986).

¹² It would have been difficult, if not impossible, to deceive participants at the OPC regarding the true purpose of the study given their ability to talk with one another about the study. Based on discussions with these participants, such conversations clearly were occurring.

While typical aversive racists do not hold open hostility or hatred towards Black individuals, they do showcase racism in more covert ways (Johnson, Whitestone, Jackson, & Gatto, 1995). These individuals find their own racism aversive, which makes them highly motivated to avoid racist actions, such as shooting Black targets more than Whites. This is particularly true when these people are reminded of their racist views, such as when the issue of race, or racial biases, is made salient (Cohn, Bucolo, Pride, & Sommers, 2009; Sommers & Ellsworth, 2000). Therefore, this literature supports the idea that providing instructions to participants before they take part in the shooting task that explicitly mentions race may motivate some of the participants to conceal their racial biases (if they have any). This would result in findings of no bias (because bias is being concealed) or bias in the unexpected direction (because bias is being overcorrected), as was found in the current study.

Regardless of whether or not aversive racism resulted in a tendency for these participants to overcompensate for their racial stereotypes, there is some evidence to suggest that the mere mention of race can influence shooting performance in simulated shooting tasks. For example, Watt (2010) had participants complete the same simulated shooting task as Correll et al. (2002), but results differed between an experimental group (who were aware the study examined race) and a control group (who received no instructions about race). Specifically, participants in the experimental group had an increased Black bias on the shooting task compared to the control group. Similar results have recently been reported by Correll (2011).

Extending Study 1 to Examine Issues Around Participant Instructions

This discussion has offered two potential explanations for the White bias found in the current study: (1) it is due to meaningful differences between Canadian and American samples with respect to the stereotypes participants might (or might not) possess, or (2) the mere mention of race in the instructions provided to participants before the shooting task somehow caused a White bias to emerge (possibly due to overcorrecting for a Black bias).

A separate program of research is clearly required to explore the extent to which Canadians and Americans differ in their racial (and other) stereotypes, and to examine how these stereotypes manifest themselves in the context of simulated shooting tasks. Rather than proceeding down that route, in this dissertation, the goal is to determine if the White shooting bias observed in this initial study replicates across different conditions and is thus worthy of further research. As such, the next step was to conduct a brief exploratory study to examine the impact of participant instructions on race-based shooting decisions. Specifically, we were interested in seeing whether mentioning race in these instructions influences the degree of racial bias that is observed.

CHAPTER 3

An Exploratory Study on the Influence of Instructional Sets on Racial Biases in a Simulated Shooting Task (Study 1b)

Purpose

The primary goal of Study 1b is to examine whether the White shooting bias identified in Study 1 can be replicated, and to determine if the expression of this bias is influenced by the instructions provided to participants before they begin the shooting task. More specifically, we were interested in whether the White bias observed in Study 1 would change depending on the extent to which participants were told to use race as a decision making heuristic. Our interest in this issue was fueled by the fact that our results differed from those reported by Correll et al. (2002, 2007a), which might be explained by the fact that our instructions for completing the shooting task also differed slightly from the instructions used by Correll and his colleagues (we highlighted the fact that our study was examining racial issues, whereas Correll et al. did not).

Method

Participants

The sample for Study 1b was restricted to students. This decision was made for two reasons. First, as will become clear below, in order to successfully carry out Study 1b, it is important that participants are unaware of the various experimental conditions. The closed environment of the OPC does not lend itself to such a study given that we know recruits and officers were discussing such matters with one another in Study 1. Second, it also seemed potentially problematic to expose recruits and officers to some of the experimental conditions, such as telling them to use race as a diagnostic cue when

making shooting decisions, when these individuals receive diversity training that instructs them to do the opposite (S. Khan, personal communication, January 26, 2010).

As such, the sample for Study 1b included 74 undergraduate participants from Carleton University who were randomly assigned to three experimental conditions (described in more detail below). The entire sample consisted of 26 males and 48 females, with the average age being 21.82 ($SD = 2.95$). The ethnicity of the sample was as follows: White = 31, Black = 8, Asian = 13, Middle Eastern = 9, Other = 8, No response = 5. Across the three experimental conditions, there was no significant difference with respect to participant gender, $\chi^2 = 1.46, p = .483$, minority status, $\chi^2 = .50, p = .780$, or age, $F(2, 70) = 1.34, p = .268$.

Measures

The measures for the current study were identical to those in Study 1. The same computer program was used to deliver the shooting task, the cognitive load ratings, the stereotype measures, and the demographic questionnaire, however the only findings that will be reported in Study 1b relate to the shooting task.¹³ The only difference between Study 1 and Study 1b was the instructions provided to participants before they were exposed to the shooting task. Thus, if differences are found between the students in Study 1 and Study 1b (e.g., with respect to the type of racial bias found) then it is likely that these differences can be attributed to the impact of the instructions and not to any task-related differences.

¹³ All analyses presented in Study 1 were also performed. In general, the results were consistent with those found in Study 1. The results related to cognitive load and implicit/explicit stereotypes are not reported here because the sole focus of Study 1b was on the impact of instructional sets on shooting performance.

Procedure

All procedures for this study were the same as Study 1, with the exception of the instructions provided to each of the three participant groups before beginning the shooting task. Recall that in this study we are primarily interested in whether the instructions provided to participants in Study 1 impacted the degree of racial bias they exhibited in their shooting decisions. Specifically, we are interested in assessing whether the mention of race in the shooting instructions influences subsequent shooting decisions. To determine if the White bias observed in Study 1 is robust across instructional sets, a procedure that was previously used by Payne et al. (2002) was adopted to examine a similar issue within the context of the weapon identification task.

Payne et al.'s (2002) procedure is useful because his conditions span the extreme range of instructional sets, while also including a set of instructions that directly mirrors those used in previous shooting studies by Correll et al. (2002, 2007a) and Plant et al. (2005) where Black shooting biases have been observed. More specifically, the instructions used by Payne et al. range from telling participants to use race when making their decisions (the "Use" race group), through not mentioning race at all (the "Control" group), to telling participants to avoid using race when making their decisions (the "Avoid" race group).

In Study 1b, all participants were given standard instructions as provided in Study 1 (e.g., you will be asked to make shoot/don't shoot decisions by pressing two different computer keys, etc.). These were the only instructions that participants in the "Control" group received. However, after receiving these instructions the two experimental groups received additional instructions, which read (adapted from Payne et al., 2002):

One main part of this study is that the targets will either be White or Black individuals. Research has shown that the race of the target sometimes impacts shooting decision making. Specifically, people often shoot Black targets more quickly and make more errors when Black targets are holding non-threatening items. These results stem from the stereotype that Black individuals are viewed as more dangerous, and therefore more likely to be armed, than White individuals.

After these instructions the “Use” race group received the following:

You have been randomly assigned to the racial profiling condition. Regardless of your personal views, we would like you to play the role of someone engaged in racial profiling. That is, try to make correct shooting decisions, but we would like you to use the race of the targets to help you identify if a threatening or non-threatening item is in the target’s hand.

While the “Avoid” race group received the following:

You have been randomly assigned to take the perspective of a completely unbiased person. Regardless of your personal views, we would like you to base your responses only on whether the object in the hand of the target is a threatening item (gun) or a non-threatening item (cell phone or wallet). Try not to let the race of the target influence your decision.

Research Question

There is very little research that has examined this issue. In addition, conflicting hypotheses emerge from the research that does exist (e.g., the aversive racism literature leads to predictions that are different than what would be predicted from previous shooting studies; Correll, 2011; Watt 2010). Given all of this, it was not possible to

establish directional hypotheses and instead we set out to simply explore whether shooting biases varied as a function of instructions (where racial issues were more or less salient). If a White bias is consistently found across conditions (i.e., no matter the instructional set provided to participants), then the bias observed in Study 1 can be viewed as relatively robust and worthy of further study.

Results

Preliminary Data Screening

As in Study 1, the shooting data (e.g., errors, RT)¹⁴, the cognitive load and explicit/implicit stereotype measures, and the demographic information were examined for the following issues: missing data, outliers, normality, and homogeneity of variance. Essentially, the same results found in Study 1 were also found in Study 1b. Missing data was not a significant issue for any of the data; outliers were an issue for the error data only, with 4 outliers (determined by having a z-score ± 3.29) needing to be substituted for a value one standard deviation higher than the next most extreme score in the distribution (Tabachnick & Fidell, 2007); normality was an issue for some variables, but the analysis of log transformed data produced the same results as non-transformed data; and homogeneity of variance was not an issue.

Main Analyses

Signal detection. As in Study 1, only correct and incorrect responses (i.e., excluding timeouts) were used to carry out the signal detection analyses. Again, the criterion estimate, c , which assesses the threshold for making a shoot response, was calculated separately for Black and White targets. The sensitivity estimate, d' , was also

¹⁴ The signal detection estimates of c and d' are based on error data, and so the screening of this data is embedded in the error data screening.

calculated for White and Black targets separately. These signal detection estimates were then submitted to separate 3 (Condition: Use vs. Avoid vs. Control) x 2 (Race: Black vs. White) mixed-model ANOVAs, with condition being a between-subjects factor and race being a within-subject factor. A summary of the data is provided in Table 6.

Table 6

Means and Standard Deviations of Decision Criterion and Sensitivity Estimates for Study 1b.

	Use		Avoid		Control	
	Black	White	Black	White	Black	White
Signal Detection	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Criterion (<i>c</i>)	.03 (.37)	-.04 (.06)	.06 (-.01)	-.04 (.06)	.05 (.23)	-.03 (.03)
Sensitivity (<i>d'</i>)	1.97 (1.07)	1.80 (1.02)	2.43 (.84)	2.28 (1.02)	2.63 (.84)	2.51 (.92)

Criterion analysis. As a refresher, placing the criterion to shoot at 0 indicates no greater tendency to make a *shoot* response than a *don't shoot* response (Correll et al., 2007a). Positive deviations from 0 indicate a *don't shoot* bias, and negative deviations indicate a *shoot* bias. The analysis of *c* revealed no main effect of race, $F(1, 71) = 1.73$, $p = .192$, $\eta^2 = .02$, although the trend was consistent with Study 1, in that the *c* estimates were higher (i.e., stricter) for Black targets ($M = .01$, $SD = .31$) compared to White targets ($M = -.04$, $SD = .05$) (see Figure 8). There was also no significant main effect for condition, $F(2, 71) = .13$, $p = .875$, $\eta^2 = .00$, and no significant Race x Condition interaction, $F(2, 71) = .16$, $p = .849$, $\eta^2 = .01$. This indicates that, for each of the target

racess, participants in the “Use”, “Avoid”, and “Control” group used similar thresholds for making shooting decisions.¹⁵

Figure 8. Decision criterion estimates representing the placement of shoot/don't shoot criteria for Black and White targets as a function of police experience for Study 1b.

Sensitivity analysis. Higher values of d' indicate that participants are better able to effectively discriminate between armed and unarmed targets. When d' was submitted to the mixed ANOVA, there was no main effect of race, $F(1, 71) = 2.04, p = .160, \eta^2 = .03$, although the trend was once again in the same direction as Study 1, whereby d' estimates were higher for Black targets ($M = 2.34, SD = .95$) than for White targets ($M = 2.19, SD = 1.02$). However, the analysis of d' indicated a significant main effect for condition, $F(2, 71) = 4.22, p = .019, \eta^2 = .11$. Pair-wise comparisons of the condition

¹⁵ As in Study 1, one-sample t-tests were conducted for Black and White targets separately to determine if the mean c 's associated with these targets differed significantly from 0. The criterion for Black targets was not significantly different from 0, $t(73) = .24, p = .811, 95\% \text{ CI } [-.062, .08]$, indicating no *shoot* or *don't shoot* bias. In contrast, the criterion for White targets was significantly below 0, $t(73) = -6.75, p < .001, 95\% \text{ CI } [-.052, -.028]$, indicating a *shoot* bias for White targets. Separate analyses of c for each condition revealed significant differences for the use, avoid, and control group, but only for White targets, $t(24) = -3.93, p = .001, 95\% \text{ CI } [-.07, -.02]$, $t(24) = -3.58, p = .002, 95\% \text{ CI } [-.07 \text{ to } .02]$, $t(24) = -5.07, p < .001, 95\% \text{ CI } [-.05, -.02]$, respectively. Consistent with Study 1, participants are showing a White bias.

effect revealed that the “Use” group exhibited smaller values of d' compared to the “Avoid” group and the “Control” group, but the latter two groups did not differ from one another (see Figure 9). This suggests that the “Use” group found it more difficult to distinguish an armed from an unarmed target, possible because participants in this group were told to pay attention to an irrelevant variable (i.e., target race), rather than the object that the target was holding. The Race x Condition interaction was not significant, $F(2, 71) = .02, p = .981, \eta^2 = .00$.

Figure 9. Sensitivity estimates for distinguishing between armed and unarmed Black and White targets as a function of police experience for Study 1b.

Reaction time. As in Study 1, reaction times for each participant from all correct responses were averaged separately for each type of target (i.e., Black and White) and each type of object (i.e., armed and unarmed). Averages were analyzed using a 3 (Condition: Use vs. Avoid vs. Control) x 2 (Race: Black vs. White) x 2 (Object: Armed vs. Unarmed) mixed-model ANOVA with repeated measures on the latter two factors. Table 7 provides a summary of the data.

Table 7

Means and Standard Deviations of Reaction Times for Study 1b

	Use		Avoid		Control	
	Black	White	Black	White	Black	White
Reaction Time	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Armed						
Milliseconds	485.32 (37.13)	487.79 (43.83)	494.56 (26.76)	490.61 (36.32)	499.81 (21.76)	487.55 (22.20)
Log Transform	6.18 (.08)	6.19 (.09)	6.20 (.05)	6.19 (.08)	6.20 (.04)	6.19 (.05)
Unarmed						
Milliseconds	519.97 (32.04)	528.06 (41.60)	532.28 (19.50)	534.45 (24.53)	522.62 (22.75)	526.20 (16.58)
Log Transform	6.25 (.06)	6.27 (.09)	6.28 (.04)	6.28 (.05)	6.26 (.04)	6.27 (.03)

There was a significant main effect for object, $F(1, 71) = 159.24, p < .001, \eta^2 = .69$, but not for race, $F(1, 71) = .67, p = .414, \eta^2 = .01$, or condition, $F(2, 71) = .62, p = .542, \eta^2 = .02$. The significant object effect indicates that participants were faster to shoot when targets were armed ($M = 489.77, SD = 31.99$) than to not shoot when targets were unarmed ($M = 527.26, SD = 24.79$) (see Figure 10). These results are consistent with Study 1 and with previous research (Correll et al., 2002, 2007a; Watt, 2010; Yoshida, 2009).

Figure 10. Reaction time (ms) for target's race and object type as a function of condition for Study 1b.

The Race x Object interaction approached significance, $F(1, 71) = 2.78, p = .100, \eta^2 = .04$, whereby the trend revealed significant differences between Black and White targets, but only for unarmed trials. Consistent with the White bias found in Study 1, the average reaction time on Black-unarmed trials was faster ($M = 524.86, SD = 25.60$) than for White-unarmed trials ($M = 529.50, SD = 29.35$). The Race x Condition, $F(2, 71) = .99, p = .378, \eta^2 = .03$, Object x Condition, $F(1, 71) = .32, p = .730, \eta^2 < .01$, and Race x Object x Condition interactions, $F(1, 71) = .09, p = .916, \eta^2 < .01$, were non-significant.

Error rates. Errors were calculated for each participant and error rates (i.e., mistakes/total-timeouts) were calculated for each type of target (i.e., Black and White) and object (i.e., armed and unarmed). The mean percentage of incorrect responses for the sample was 12.69 and the mean number of timeouts was 11.62. These rates are consistent with Study 1.

Participants' error rates were subjected to a 3 (Condition: Use vs. Avoid vs. Control) x 2 (Race: Black vs. White) x 2 (Object: Armed vs. Unarmed) mixed-model ANOVA with repeated measures on the latter two factors. A summary of the data is provided in Table 8.

Table 8

Means and Standard Deviations of Error Rates for Study 1b

	Use		Avoid		Control	
	Black	White	Black	White	Black	White
Error Rates	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Armed						
Error Rates	.19 (.15)	.16 (.13)	.13 (.11)	.12 (.10)	.12 (.10)	.07 (.07)
Log Transform	.17 (.12)	.14 (.11)	.12 (.09)	.11 (.09)	.11 (.09)	.07 (.07)
Unarmed						
Error Rates	.19 (.16)	.22 (.14)	.14 (.13)	.16 (.13)	.11 (.09)	.13 (.09)
Log Transform	.17 (.13)	.19 (.11)	.13 (.11)	.14 (.11)	.10 (.08)	.12 (.08)

There was a significant effect found for object, $F(1, 71) = 5.41, p = .023, \eta^2 = .02$, but not for race, $F(1, 71) = .06, p = .803, \eta^2 < .01$. Participants made fewer errors when exposed to armed targets ($M = .13, SD = .12$) compared to unarmed targets ($M = .16, SD = .13$) (see Figure 11). The between-subject effect of condition was also significant, $F(2, 71) = 4.94, p = .010, \eta^2 = .12$. Post-hoc analyses indicated that the "Use" group had significantly higher error rates than the "Control" group, but neither of these

groups differed from the “Avoid” group. Similar to the sensitivity results, it follows that the “Use” group probably made more errors because this group was paying attention to target race, which would only distract them from the purpose of the task.

Figure 11. Error rates for the targets' race and object type as a function of condition for Study 1b.

Finally, analyses revealed a significant interaction between Race x Object, $F(1, 71) = 7.71, p = .007, \eta^2 < .01$ (see Figure 12). Further examination of the results revealed differences between armed and unarmed trials, but only for White targets. That is, more errors were made with White unarmed targets ($M = .17, SD = .13$) than with White armed targets ($M = .12, SD = .11$). This finding is consistent with the previous criterion and sensitivity results and suggests the presence of a White bias. The Race x Condition, $F(2, 71) = .29, p = .747, \eta^2 = .01$, Object x Condition, $F(2, 71) = .01, p = .990, \eta^2 < .01$, and Race x Object x Condition interactions, $F(1, 71) = .21, p = .808, \eta^2 < .01$, were all non-significant.

Figure 12. Error rates for the type of targets' object as a function race for Study 1b.

Discussion

The primary goal of Study 1b was to determine if the White shooting bias that was observed in Study 1 could be replicated under conditions where the instructional set provided to participants varied. Generally speaking, the results found in Study 1b did replicate previous results, regardless of the condition to which participants were assigned. Indeed, whether target race was mentioned or not, participants in this study revealed a consistent tendency (albeit, not always a significant one) to be more biased towards White targets. In contrast to previous research from the U.S., not only did the current participants tend to have a more “trigger happy” response to White, rather than Black targets, they also had a slightly harder time distinguishing armed from unarmed targets when the target was White. Also, participants responded slightly quicker and more accurately to armed White targets and unarmed Black targets.

The fact that participants exhibited a White bias in the control group, which mirrored the instructions used in previous research where Black biases have been found

(e.g., Correll et al., 2002, 2007a, 2011), suggests that the results of Study 1 cannot simply be attributed to the fact that those participants knew that the study was about race. Instead, the results suggest that these participants have a genuine bias towards shooting White (versus Black) targets. The results from the other two conditions support this view. Despite the fact that the instructions provided to participants in the “Use” race and “Avoid” race conditions indicated that Black people are typically perceived as more dangerous than White people, participants in these groups were just as likely as the control participants to show evidence of a White bias.

What varying the instructional sets did do was influence how well participants performed on the shooting task, irrespective of target race. For example, instructing participants to “Use” race (an irrelevant cue) when making shooting decisions did lead them to perform more poorly compared to those in the “Control” and “Avoid” groups, at least with respect to sensitivity and errors. Presumably, this is because target race interferes with the decision making process and prevents them from utilizing controlled processes within the available response window to identify relevant decision cues.

All in all, the results from Study 1 and 1b suggest that, in contrast to American samples, Canadian participants display a robust White bias when making shooting decisions. Given the consistency of this result across the two studies, it seems appropriate to view the bias as a worthwhile phenomenon to study. Study 2 and 3 will examine this bias to further assess the degree to which it can be replicated, while also examining factors that may increase or decrease the extent to which the bias is expressed.

CHAPTER 4

The Influence of Scene Complexity on Racial Bias in a Simulated Shooting Task (Study 2)

Purpose

The goal of Study 2 was to determine whether increasing the complexity of the shooting task (i.e., by adding distracter items) would increase the degree to which a racial bias is found in shooting performance. Specifically, it was expected that making a shooting scenario more difficult (i.e., by increasing the visual complexity of a scene) would increase the likelihood that cognitive resources would be depleted when encountering that scenario. Theoretically, this could result in participants relying more on automatic processes (i.e., stereotypes) in the shooting task, thus increasing racially biased shooting decisions.

Method

Pilot Work

To investigate the impact of target race and scene complexity on shooting decisions, it was first necessary to create photo stimuli to use in the shooting task. The photos of the models taken for Study 1 were used in Study 2. However, these models needed to be superimposed on a new set of background images that were taken specifically for the purpose of Study 2. These background photos were taken in such a way that the complexity of the scenes varied (from low to high) with respect to the number of distracter items present. In an attempt to increase variability in the background images, five settings were used for the photo shoot – an office, a library, a garage, a kitchen, and a storage space. In each setting, the number of items visible in the low

complexity photos was intended to be significantly less than the number of items visible in the high complexity photos. Given these manipulations, we had 10 different background images (5 settings x 2 levels of complexity). As in Study 1, Adobe PhotoShop was used to construct the final images that appeared in the shooting task (see Appendix J).

Manipulation Check of Complexity Photo Stimuli

A manipulation check was performed for all complexity photo stimuli in order to ensure that they represented the desired degree of complexity (e.g., that the assumed high complexity scenes were in fact perceived as highly complex). A total of 25 undergraduate students viewed each photo and were asked to: (1) estimate how many items were present in each photo, and (2) rate each photo on a 9-point scale in terms of its visual complexity (ranging from 1 = extremely low complexity to 9 = extremely high complexity).

Results revealed significant differences in the number of items estimated across the photos that were assumed to be low ($M = 52.92$, $SD = 43.47$) and high ($M = 960.56$, $SD = 1043.16$) complexity and the difference was in the anticipated direction, $t(24) = -4.39$, $p = .001$. Also, participants perceived the photos that were assumed to be low complexity photos as significantly less complex ($M = 1.94$, $SD = .70$) than the high complexity photos ($M = 6.51$, $SD = 1.08$), $t(24) = -19.27$, $p < .001$.

Participants

Study 2 had 130 participants who completed the study (Students = 50, Recruits = 50, Officers = 30).¹⁶ The gender breakdown for the entire sample was 82 males and 38 females. There was a significant difference with respect to gender across the participant

¹⁶ The officer sample included only 30 individuals because the OPC semester ended before the study was complete and there were no more opportunities to approach advanced officers for participation.

groups, $\chi^2 = 29.59, p < .001$, whereby the proportion of females to males was greater in the student sample (Male = 17, Female = 33) compared to the recruits (Male = 40, Female = 10) and officers (Male = 25, Female = 5). The average age across all participants was 27.72 ($SD = 8.59$) and there was a significant difference in age between the groups, $F(2, 126) = 160.89, p < .001$. Unsurprisingly, students were the youngest participants ($M = 20.90, SD = 2.30$), followed by recruits ($M = 26.94, SD = 4.92$), followed by officers ($M = 39.90, SD = 6.37$). The highest level of participants' education was recorded (High school = 45, College = 48, Undergraduate = 30, Master's = 4, Other = 3). The ethnicity of the sample was as follows: White = 86, Black = 11, Asian = 10, Middle Eastern = 5, Aboriginal = 6, Other = 9, No response = 12. As in Study 1, the minority status of participants differed across groups, $\chi^2 = 6.83, p = .033$, with a higher proportion of minorities being represented in the student sample (Yes = 18, No = 32), compared to the recruits (Yes = 9, No = 41) and officers (Yes = 4, No = 26).

Measures

The measures used in Study 2 were the same as Study 1.

Procedure

The procedure for Study 2 was the same as Study 1 with one exception – while participants were exposed to the same targets used in Study 1 (i.e., armed or unarmed Black and White targets standing in one of five poses) the targets were superimposed on either low or high complexity backgrounds.

Hypotheses

As indicated in the following list of hypotheses, the same sorts of issues examined in Study 1 will be examined in Study 2. However, there are several noticeable differences for the Study 2 hypotheses. One key difference is that, based on the results of Study 1 and 1b, a White shooting bias is now expected instead of a Black shooting bias. Another difference is that the role of police experience, cognitive load, and implicit/explicit stereotypes, while still examined, are underemphasized in the hypotheses. Not only is this because these variables seemed to shed little light on why the shooting bias emerged in Study 1 and 1b, but also because the focus of Study 2 is on the impact of scene complexity on shooting performance. The following hypotheses were tested in Study 2:

1. (a) The criterion for White targets will be lower (more lenient) than for Black targets, indicating a bias towards shooting White targets.
- (b) The criterion will vary as a function of scene complexity, such that a lower criterion will be set on high, compared to low, complexity trials.
- (c) The analysis of the criterion will reveal a Race x Complexity interaction. The criterion is expected to be lower for White targets on high complexity versus low complexity trials, but the criterion is expected to be similar for Black targets across high and low complexity trials.
- (d) Sensitivity will vary as a function of target race, such that it will be lower for White versus Black targets.
- (e) Sensitivity will vary as a function of scene complexity, whereby sensitivity scores will be lower for high, compared to low, complexity trials.

(f) The analysis of sensitivity will reveal a Race x Complexity interaction.

Sensitivity is expected to be lower for White targets on high versus low complexity trials, but sensitivity is expected to be similar for Black targets across high and low complexity trials.

2. (a) Reaction times will vary as a function of scene complexity, whereby participants will be faster to make correct responses on low, compared to high, complexity trials.

(b) The analysis of reaction times will reveal a Race x Object interaction, whereby armed White targets will be shot quicker than armed Black targets, but participants will not shoot unarmed Black targets more quickly than unarmed White targets.

3. (a) Error rates will vary as a function of scene complexity, whereby participants will make fewer errors on low versus high complexity trials.

(b) The analysis of error rates will reveal a Race x Object interaction. It is predicted that armed White targets will be shot more often than armed Black targets and participants will not shoot unarmed Black targets more often than unarmed White targets.

(c) The analysis of error rates will also reveal a Race x Object x Complexity interaction. Specifically, it is expected that the error rate will be higher for unarmed White targets on high versus low complexity trials (but less of an increase will be observed for unarmed Black targets). In contrast, the error rate will be higher for armed Black targets on high versus low complexity trials (but less of an increase will be observed for armed White targets).

Results

Preliminary Data Screening

As in Study 1, the shooting data (e.g., errors, RT)¹⁷, the cognitive load and explicit/implicit stereotype measures, and the demographic information were examined for the following issues: missing data, outliers, normality, and homogeneity of variance. Essentially, the same results found in Study 1 and 1b were also found in Study 2. Missing data was not a significant issue for any of the data; outliers were an issue for the error data only, with 9 outliers (having a z-score +/- 3.29) needing to be substituted for a value one standard deviation higher than the next most extreme score (Tabachnick & Fidell, 2007); normality was an issue for some variables, but the analysis of log transformed data produced the same results; and homogeneity of variance was not an issue.

Main Analyses

Signal detection. As with previous studies, correct and incorrect responses (i.e., excluding timeouts) were used to conduct signal detection analyses. The criterion estimate, c , which assesses the threshold for making a shoot response, was calculated separately for Black and White targets. The sensitivity estimate, d' , or the ability to discriminate armed from unarmed targets, was also calculated for White and Black targets separately. These signal detection estimates were then submitted to separate 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) x 2 (Complexity: Low vs. High) mixed-model ANOVAs, with experience being a between-subjects factor and race and complexity being within-subject factors. A summary of the data is provided in Table 9.

¹⁷ The signal detection estimates of c and d' are based on error data, and so the screening of this data is embedded in the error data screening.

Table 9

Means and Standard Deviations of Decision Criterion and Sensitivity Estimates for Study 2

	Students		Recruits		Officers	
	Black	White	Black	White	Black	White
Signal Detection	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Low Complexity						
Criterion (<i>c</i>)	-.30(.35)	-.14(.13)	-.14(.33)	-.10(.32)	-.20(.34)	-.12(.14)
Sensitivity (<i>d'</i>)	2.57(.86)	2.92(1.01)	3.09(.67)	3.27(.62)	3.13(.63)	3.04(.94)
High Complexity						
Criterion (<i>c</i>)	-.06(.31)	-.26(.34)	-.06(.20)	-.22(.15)	-.08(.26)	-.19(.43)
Sensitivity (<i>d'</i>)	2.80(.83)	2.12(.72)	3.32(.66)	2.65(.87)	3.32(.74)	2.59(.67)

Criterion analysis. Recall that placing the criterion to shoot at 0 indicates no greater tendency to make a *shoot* or *don't shoot* response, whereas deviations in a positive direction indicate a *don't shoot* bias and deviations in the negative direction indicate a *shoot* bias. The analysis of *c* revealed no significant effect of race, $F(1, 127) = 1.82, p = .179, \eta^2 = .01$, which does not support hypothesis 1a and is somewhat surprising given that a White bias was found for *c* in Study 1 (see Figure 13). However, in line with the results from Study 1b, the trend was still in the direction of a White bias, in that *c* was slightly higher (i.e., stricter) for Black targets ($M = -.14, SD = .31$) compared to White targets ($M = -.17, SD = .27$) (though in both cases a *shoot* bias was

evident).¹⁸ In contrast to what was expected in hypothesis 1b, there was also no significant effect of complexity, $F(1, 127) = .66, p = .418, \eta^2 = .01$. Furthermore, there was not a significant between-subjects effect of experience, $F(2, 127) = 2.10, p = .127, \eta^2 = .03$.

Figure 13. Decision criterion estimates representing the placement of the shoot/don't shoot criteria for Black and White targets across low and high complexity scenes as a function of police experience for Study 2.

While the Race x Experience, $F(2, 127) = .91, p = .405, \eta^2 = .01$, Complexity x Experience, $F(2, 127) = .36, p = .699, \eta^2 = .01$, and Race x Complexity x Experience interactions, $F(2, 127) = 1.58, p = .209, \eta^2 = .02$, were all non-significant, the Race x Complexity interaction was significant, $F(1, 127) = 26.26, p < .001, \eta^2 = .17$, which was expected in hypothesis 1c (see Figure 14). In line with this hypothesis, c was significantly lower for White targets on high complexity trials ($M = -.23, SD = .31$) than low

¹⁸ Results from one-sample t-tests showed that all c scores were significantly below zero, indicating a *shoot* bias across all conditions: Black-Low targets, $t(129) = -7.16, p < .001, 95\% \text{ CI } [-.27, -.15]$; Black-High targets, $t(129) = -2.89, p = .005, 95\% \text{ CI } [-.11, -.02]$; White-Low targets, $t(129) = -6.27, p < .001, 95\% \text{ CI } [-.16, -.08]$; and White-High targets, $t(129) = -8.45, p < .001, 95\% \text{ CI } [-.28, -.17]$.

complexity trials ($M = -.12$, $SD = .22$). However, in contrast to what was expected, c was significantly lower for Black targets on low complexity trials ($M = -.21$, $SD = .34$) compared to high complexity trials ($M = -.07$, $SD = .26$).

Figure 14. Decision criterion (c) for the complexity of the scene as a function of race of the target for Study 2.

In light of the results that were reported in Study 1 and 1b, it is unclear why a *shoot* response was favoured for Black targets on both high and low complexity trials (especially low complexity trials). However, the increased tendency for participants to rely on a *shoot* response for White targets on high complexity trials makes sense and suggests that participants were unable to rely on controlled processes when confronted with high complexity scenes. As Moreno and Bodenhausen (1999) explain, when mental resources are strained, as they likely are when confronted with high complexity scenes, stereotypes can act as heuristics, and are thus more likely to be relied upon.

Sensitivity analysis. With respect to d' , there was a significant effect of race, $F(1, 127) = 21.59$, $p < .001$, $\eta^2 = .15$ (see Figure 15). Consistent with Study 1 and hypothesis

1d, participants were better able to distinguish armed from unarmed targets when the target was Black ($M = 2.75$, $SD = .96$) compared to White ($M = 2.53$, $SD = .99$).

Arguably, participants exhibited lower levels of sensitivity for White targets because the automatic activation of a White stereotype was interfering with their ability to identify the presence or absence of a weapon.

Also, as anticipated in hypothesis 1e, there was a significant effect of complexity, $F(1, 127) = 12.38$, $p < .001$, $\eta^2 = .09$, whereby participants were better at distinguishing armed from unarmed targets on low ($M = 2.73$, $SD = .96$) versus high complexity trials ($M = 2.55$, $SD = .99$). This suggests that the additional items contained in the high complexity scenes did in fact distract participants and prevented them from being able to rely on controlled processing to identify the presence of weapons (at least, they were unable to discriminate armed from unarmed targets as well as with low complexity).

Figure 15. Sensitivity estimates for distinguishing between armed and unarmed Black and White targets across low and high complexity scenes as a function of police experience for Study 2.

The between-subjects effect of experience was also significant, $F(1, 127) = 11.55$, $p < .001$, $\eta^2 = .15$. Pair-wise comparisons revealed that officers and recruits ($M = 2.88$, $SD = .89$; $M = 2.86$, $SD = .89$, respectively) exhibited significantly higher sensitivity scores ($p < .001$) than students ($M = 2.28$, $SD = 1.02$), but that officers and recruits did not differ from one another. Recall that in Study 1, it was proposed that those with more police experience would draw on shooting schemas when completing the shooting task, and thus be better at distinguishing weapons from non-weapons (i.e., using controlled processing). While there is more support for this idea here, this support is limited because police officers and recruits did not differ from one another in their sensitivity levels.

As with the criterion analysis, the Race x Experience, $F(2, 127) = 1.36$, $p = .262$, $\eta^2 = .02$, Complexity x Experience, $F(2, 127) = .55$, $p = .579$, $\eta^2 = .01$, and Race x Complexity x Experience interactions, $F(2, 127) = .77$, $p = .464$, $\eta^2 = .01$, were all non-significant. However, consistent with the criterion analysis and hypothesis 1f, the Race x Complexity interaction was significant, $F(1, 127) = 44.72$, $p < .001$, $\eta^2 = .26$ (see Figure 16). Consistent with expectations, simple effects analyses revealed that the significant differences were only for White targets, whereby sensitivity for White targets was significantly lower on high complexity trials ($M = 2.43$, $SD = .81$) compared to low complexity trials ($M = 3.08$, $SD = .87$). This decrease in sensitivity for White targets on high complexity trials is consistent with the idea that scene complexity prevents the use of controlled processes for identifying weapon presence in the short response window available, especially when cognitive resources are already depleted because attention is also being paid to the race of the target.

Figure 16. Sensitivity (d') for the complexity of the scene as a function of race of the target for Study 2.

Reaction time. Reaction times for each participant from all correct responses were averaged separately for each type of target (i.e., Black and White) and each type of object (i.e., armed and unarmed). Averages were analyzed using a 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) x 2 (Object: Armed vs. Unarmed) x 2 (Complexity: Low vs. High) mixed-model ANOVA with repeated measures on the latter three factors. A summary of the data is provided in Table 10.

Table 10

Means and Standard Deviations of Reaction Times for Study 2

	Students		Recruits		Officers	
	Black	White	Black	White	Black	White
Reaction Time	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Low Complexity						
Armed						
Milliseconds	481.67 (75.52)	473.63 (32.04)	494.96 (28.97)	481.59 (29.24)	491.17 (40.10)	476.71 (43.67)
Log Transform	6.13 (.47)	6.16 (.07)	6.20 (.06)	6.18 (.06)	6.20 (.08)	6.17 (.07)
Unarmed						
Milliseconds	510.41 (39.62)	506.60 (41.20)	525.56 (22.79)	516.44 (26.53)	527.13 (34.30)	520.80 (26.75)
Log Transform	6.23 (.08)	6.23 (.08)	6.27 (.04)	6.25 (.05)	6.27 (.07)	6.26 (.05)
High Complexity						
Armed						
Milliseconds	486.79 (51.46)	495.45 (41.16)	488.21 (29.05)	504.79 (26.87)	479.96 (35.03)	497.10 (42.98)
Log Transform	6.18 (.12)	6.20 (.08)	6.19 (.06)	6.22 (.05)	6.17 (.07)	6.21 (.09)
Unarmed						
Milliseconds	522.41 (37.95)	529.12 (36.52)	528.23 (25.22)	546.04 (23.94)	537.84 (32.34)	544.75 (27.57)
Log Transform	6.26 (.08)	6.27 (.07)	6.27 (.05)	6.30 (.04)	6.29 (.06)	6.30 (.05)

There was a significant effect of object, $F(1,127) = 282.73, p < .001, \eta^2 = .69$, whereby participants responded faster to armed targets ($M = 487.89, SD = 42.46$) than unarmed targets ($M = 525.30, SD = 33.85$) (see Figure 17). This is consistent with previous research (Correll et al., 2002; Watt, 2010; Yoshida, 2009), as well as Study 1 and 1b. Consistent with hypothesis 2a, there was also a significant effect of complexity, $F(1, 127) = 75.86, p < .001, \eta^2 = .37$, whereby participants were faster to respond on low complexity trials ($M = 500.56, SD = 43.16$) than high complexity trials ($M = 513.39, SD = 41.06$). This result makes sense given that it is presumably easier for participants to process the information contained in low complexity scenes compared to high complexity scenes. There was no significant effect of race, $F(1, 127) = .79, p = .377, \eta^2 = .01$, or experience, $F(2, 127) = 1.70, p = .186, \eta^2 = .03$.

Figure 17. Reaction time for the type of trial as a function of police experience for Study 2.

In contrast to what was expected in hypothesis 2b, the Race x Object interaction was not significant, $F(1, 127) = .08, p = .772, \eta^2 = .001$. Neither were the Race x Experience, $F(2, 127) = .18, p = .834, \eta^2 < .01$, or the Complexity x Experience interactions, $F(2, 127) = .82, p = .443, \eta^2 = .01$. However, several interactions were significant.

For example, the Race x Complexity interaction was significant, $F(1, 127) = 65.70, p < .001, \eta^2 = .34$ (see Figure 18). Simple effects analyses revealed that there were significant differences for White targets, but not Black targets, whereby responses on low complexity trials ($M = 495.53, SD = 38.17$) were significantly faster than on high complexity trials ($M = 519.33, SD = 39.36$). These results are consistent with previous results from this study (i.e., lower criterion and sensitivity scores for White targets, but less so for Black targets, under conditions of high versus low complexity). Again, these findings lend support to the idea that when confronted with high complexity scenes participants are less able to rely on controlled processing and may revert to automatic stereotyping (Macrae, Stangor, & Milne, 1994). Of course, this can be harmful if those stereotypes are negative, as they seem to be for White targets.

Figure 18. Reaction time for the complexity of the scene as a function of race of the target for Study 2.

There was also an Object x Complexity interaction, $F(1,127) = 11.02, p < .001, \eta^2 = .08$ (see Figure 19). Simple effects analyses revealed that participants were significantly slower in responding to unarmed targets on high complexity trials ($M = 533.72, SD = 32.19$) compared to low complexity trials ($M = 516.88, SD = 33.44$), but that a significant difference in response speed was not observed for armed targets ($M = 492.59, SD = 39.03$ and $M = 483.19, SD = 45.22$ for high and low complexity, respectively). It seems that high complexity trials cause problems when participants have to make *don't shoot* responses, but not *shoot* responses, which is most likely related to the challenge of pressing a key to indicate a *don't shoot* response. The fact that this was less of a problem when participants encountered low complexity trials, presumably indicates that the lack of distracter items compensates for the cognitive demands placed on participants when having to press a key to indicate a *don't shoot* response.

Figure 19. Reaction time for the complexity of the scene as a function of the type of object for Study 2.

The Object x Experience also approached significance, $F(2, 127) = 2.73, p = .069$, $\eta^2 = .041$, whereby students were significantly faster to respond on unarmed trials compared to recruits and officers. There was also a significant 3-way interaction between Race x Complexity x Experience, $F(2, 127) = 3.21, p = .044$, $\eta^2 = .05$ (see Figure 20). Further examination of this interaction revealed that students were significantly faster than recruits on the Black-Low complexity trials ($M = 496.04, SD = 61.71$; $M = 510.26, SD = 30.15$, respectively) and the White-High complexity trials ($M = 512.29, SD = 42.25$; $M = 525.42, SD = 32.73$). No other differences were observed. It is currently unclear why students might have responded faster on these specific trials.

Figure 20. Reaction time for the complexity of the scene as a function of race for the samples of students, recruits, and officers for Study 2.

The Object x Complexity x Experience, $F(2, 127) = 1.03$, $p = .360$, $\eta^2 = .02$, Race x Object x Complexity, $F(1, 127) = 2.40$, $p = .124$, $\eta^2 = .02$, and Race x Object x Complexity x Experience interactions, $F(2, 127) = .54$, $p = .587$, $\eta^2 < .01$, were all non-significant.

Error rates. As in Study 1, errors were calculated for each participant and error rates (i.e., mistakes/total-timeouts) were calculated for each type of target (i.e., Black and White) and object (i.e., armed and unarmed). The mean percentage of incorrect responses for the entire sample was 5.29 and the mean number of timeouts was 5.56. These rates are less than half of Study 1, which is likely the result of the inclusion of low complexity scenes where a reasonably high degree of decision accuracy could be achieved. Participants' error rates were subjected to a 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) x 2 (Object: Armed vs. Unarmed) x 2 (Complexity:

Low vs. High) mixed-model ANOVA with repeated measures on the latter three factors.

A summary of the data is provided in Table 11.

Table 11

Means and Standard Deviations of Error Rates for Study 2

	Students		Recruits		Officers	
	Black	White	Black	White	Black	White
Error Rates	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>
Low Complexity						
Armed						
Error Rates	.12(.14)	.15(.16)	.09(.10)	.10(.13)	.06(.08)	.11(.13)
Log Transform	.11(.12)	.13(.13)	.08(.09)	.08(.11)	.06(.07)	.10(.11)
Unarmed						
Error Rates	.20(.17)	.12(.14)	.10(.12)	.08(.11)	.11(.12)	.06(.07)
Log Transform	.17(.13)	.11(.12)	.09(.10)	.07(.10)	.10(.10)	.05(.06)
High Complexity						
Armed						
Error Rates	.17(.14)	.17(.14)	.08(.11)	.10(.14)	.08(.11)	.12(.11)
Log Transform	.15(.12)	.15(.12)	.08(.09)	.09(.11)	.07(.10)	.10(.10)
Unarmed						
Error Rates	.12(.13)	.24(.16)	.06(.09)	.16(.13)	.07(.13)	.17(.15)
Log Transform	.10(.11)	.21(.13)	.06(.08)	.14(.11)	.06(.10)	.15(.12)

There was a significant effect of race, $F(1, 127) = 11.85, p = .001, \eta^2 = .09$ (see Figure 21). Overall, participants made more errors when encountering White targets ($M = .13, SD = .14$) compared to Black targets ($M = .11, SD = .14$). This finding is consistent with the previous results of this study (i.e., sensitivity estimates and reaction times) and those of Study 1, where more errors were made for White versus Black targets. Also consistent with Study 1 was the significant effect of experience, $F(1, 127) = 9.87, p < .001, \eta^2 = .13$, whereby students ($M = .16, SD = .16$) made significantly more errors than recruits and officers ($M = .10, SD = .12$; $M = .09, SD = .11$, respectively). As expected in hypothesis 3a, there was an effect of scene complexity, $F(1, 127) = 9.42, p = .003, \eta^2 = .07$, in that participants made significantly more errors on high complexity trials ($M = .13, SD = .14$) compared to low complexity trials ($M = .11, SD = .13$). Presumably, more complex scenes made it less likely that participants could rely on controlled processing, which would result in more mistakes being made. The effect of object was not significant, $F(1, 127) = 1.84, p = .178, \eta^2 = .01$, which is consistent with Study 1.

Figure 21. Error rates for the type of trial as a function of police experience for Study 2.

The majority of 2-way interactions were not significant, including the Race x Object interactions that was predicted in hypotheses 3b, $F(1, 127) = .40, p = .529, \eta^2 < .01$). Specifically, the Race x Experience, $F(2, 127) = .39, p = .680, \eta^2 < .01$, Object x Experience, $F(2, 127) = .08, p = .924, \eta^2 < .01$, Complexity x Experience, $F(1, 127) = .80, p = .452, \eta^2 = .01$, and Object x Complexity interactions, $F(1, 127) = 1.03, p = .313, \eta^2 = .01$, were all non-significant. However, as with the previous results, there was a significant interaction between Race x Complexity, $F(1, 127) = 26.63, p < .001, \eta^2 = .17$ (see Figure 22).

Figure 22. Error rates for the complexity of the scene as a function of race of the target for Study 2.

Simple effects analyses revealed that there were significant differences for White targets, but not Black targets, such that participants made fewer errors on the low complexity trials ($M = .09$, $SD = .12$) compared to high complexity trials ($M = .16$, $SD = .15$). As discussed above, this suggests that participants are less able to use controlled responding on the high complexity trials especially when they possess stereotypes that distract them from identifying whether a weapon is present (Gilbert & Hixon, 1991).

In addition, as anticipated in hypothesis 3c, there was a Race x Object x Complexity interaction, $F(1, 127) = 30.51$, $p < .001$, $\eta^2 = .20$ (see Figure 23). As expected, the error rate was significantly higher for unarmed White targets on high ($M = .20$, $SD = .15$) versus low ($M = .09$, $SD = .12$) complexity trials, but there was not a significant increase in error rates for unarmed Black targets on high ($M = .09$, $SD = .12$) versus low ($M = .14$, $SD = .15$) complexity trials. However, not consistent with hypothesis 3c, the error rate was not significantly higher for armed Black targets on high ($M = .12$, $SD = .14$) versus low ($M = .10$, $SD = .14$) complexity trials, and there was not a

significant increase in error rates for armed White targets on high ($M = .13$, $SD = .14$) versus low ($M = .09$, $SD = .12$) complexity trials. Part of these findings accord well with the presence of a White shooting bias when their cognitive resources are taxed in high complexity scenarios.

Figure 23. Error rates for the object type as a function of race of the target for low and high complexity trials for Study 2.

The remaining 3-way interactions, including the Race x Object x Experience, $F(2, 127) = .96, p = .388, \eta^2 = .02$, Race x Complexity x Experience, $F(2, 127) = .17, p = .842, \eta^2 < .01$, and Object x Complexity x Experience interactions, $F(2, 127) = 1.16, p = .316, \eta^2 = .02$, were not significant, nor was the 4-way interaction of Race x Object x Complexity x Experience, $F(2, 127) = 1.46, p = .235, \eta^2 = .02$.

Cognitive load items and stereotype analyses. As in Study 1, cognitive load and stereotype measures were collected in the hope that they would shed light on the results presented above. A summary of this data is provided in Table 12.

Table 12

Means and Standard Deviations of Cognitive Load Items and Stereotype Measures for Study 2

	Students	Recruits	Officers
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Cognitive Load Items			
Perceived Difficulty (/9)	6.38 (1.85)	6.08 (1.72)	6.17 (1.76)
Mental Effort Expended (/9)	7.10 (1.42)	6.24 (1.89)	6.67 (1.95)
Stereotype Measures			
IAT (D)	.55 (.42)	.48 (.44)	.64 (.32)
SRS (/31)	16.42 (2.89)	16.02 (2.77)	16.97 (2.97)
Adjective Checklist			
Cultural Black Stereotype (/18)	11.06(3.72)	7.90(4.61)	7.30(4.05)
Cultural White Stereotype (/18)	4.46(2.86)	5.72(4.12)	5.30(3.93)
Personal Black Beliefs (/18)	5.54(4.59)	3.42(3.15)	1.63(1.96)
Personal White Beliefs (/18)	4.56(4.03)	3.98(3.64)	2.47(2.99)
Interpersonal Interactions			
Frequency with Blacks (/5)	3.56 (1.09)	3.52 (.97)	2.90 (.99)
Frequency with Whites (/5)	4.44 (.79)	4.70 (.58)	4.70 (.60)
Valence with Blacks (/5)	3.86 (.81)	3.72 (.73)	3.67 (.84)
Valence with Whites (/5)	3.82 (.77)	3.72 (.67)	3.57 (.77)
Motivation to Control Prejudice			
External Sub-scale (/45)	32.24 (7.06)	27.72 (5.28)	30.07 (4.51)
Internal Sub-scale (/40)	24.64 (4.26)	23.34 (3.96)	25.27 (3.31)
Total Scale (/85)	56.88 (9.56)	51.06 (8.47)	55.33 (6.24)

Cognitive load measures. In part, the cognitive load data was examined to determine if participants with more police experience would experience lower levels of cognitive load during the shooting task (and thus perform better). Already, the previous studies and the performance data suggest that support for this finding is unlikely and no differences between the groups were found with respect to perceived difficulty, $F(2, 127) = .37, p = .692, \eta^2 < .01$. However, when the amount of effort expended during the task was examined, the difference approached significance, $F(2, 127) = 3.06, p = .051, \eta^2 = .05$. Post-hoc comparisons revealed that students expended more effort than recruits, but there were no differences between those groups and officers, which is not consistent with the idea that police experience influences cognitive load.

Implicit association test. Recall, that more positive D scores indicate an implicit association between the concepts of Black-bad and White-good, whereas more negative scores indicate an implicit association between Black-good and White-bad. The average D score across all experience levels was .55 ($SD = .41$, range -.33 to 1.55) indicating a moderate association between the concepts Black and bad. A one-way ANOVA indicated that IAT scores did not differ significantly across the groups, $F(2, 125) = 1.47, p = .233, \eta^2 = .02$.

Symbolic racism scale. A Cronbach's α of .41 was obtained for responses on the SRS, indicating a low level of internal consistency (Henry & Sears, 2002). All groups had what appears to be a moderate degree of racism. The mean across groups was 16.39 ($SD = 2.86$), which is consistent with Study 1. No significant differences existed between the students, recruits, or officers with respect to their SRS scores, $F(2, 127) = 1.03, p = .359, \eta^2 = .02$.

Adjective checklist. As in Study 1, participants were asked to highlight adjectives that they felt characterized: (a) a cultural stereotype of Black and White individuals and (b) their own personal stereotype of Black and White individuals. The data related to cultural stereotypes was submitted to a 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) mixed-model ANOVA. As in Study 1, there was a significant effect found for race, $F(1, 127) = 62.24, p < .001, \eta^2 = .33$, where participants selected more negative adjectives to represent Black cultural stereotypes ($M = 8.98, SD = 4.45$) than White cultural stereotypes ($M = 5.14, SD = 3.65$). The between-subject effect of experience approached significance ($F(2, 127) = 2.52, p = .084, \eta^2 = .04$). Post-hoc analyses indicated that students endorsed more negative stereotypes in general than officers, but neither group differed from recruits. Lastly, the Race x Experience interaction was significant, $F(2, 127) = 12.18, p < .001, \eta^2 = .16$. Further examination indicated that students selected significantly more negative adjectives than recruits and officers for Black cultural stereotypes, whereas the groups did not differ from each other with respect to their endorsement of White cultural stereotypes.

The data related to personal stereotypes were also submitted to a 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) mixed-model ANOVA. Unlike Study 1, there was no significant effect for race, $F(1, 127) = .26, p = .608, \eta^2 < .01$. However, the between-subject effect of experience was significant, $F(2, 127) = 7.79, p < .001, \eta^2 = .11$. Post-hoc analyses indicated that students ($M = 5.05, SD = 4.32$) selected significantly more negative adjectives than recruits to describe their personal stereotypes ($M = 3.70, SD = 3.40$), who selected significantly more negative adjectives than officers ($M = 2.05, SD = 2.54$). Lastly, the Race x Experience interaction was

significant, $F(2, 127) = 4.78, p = .011, \eta^2 = .07$. Officers endorsed significantly fewer adjectives than both students and recruits when describing their Black stereotypes and recruits endorsed significantly fewer adjectives than students. No significant differences were observed across the groups with respect to their White personal stereotypes.

Frequency and valence of interpersonal interactions. Next, the frequency and valence of participants' interactions with Black and White individuals was examined. Frequency scores were submitted to a 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) mixed-model ANOVA. As in Study 1, while there was no significant effect for experience, $F(2, 127) = 2.18, p = .117, \eta^2 = .03$, there was a significant effect found for race, $F(1, 127) = 150.49, p < .001, \eta^2 = .54$, with participants indicating that they engage in significantly more interactions with White ($M = 4.60, SD = .68$) versus Black individuals ($M = 3.39, SD = 1.05$). Also consistent with Study 1, the Race x Experience interaction was significant, $F(2, 127) = 5.90, p = .004, \eta^2 = .09$. As in previous studies, officers had significantly fewer interactions ($M = 2.90, SD = .99$) with Black individuals than both recruits ($M = 3.52, SD = .97$) and students ($M = 3.56, SD = 1.09$), however there was no difference between the groups with respect to White individuals.

Of potentially more interest was the valence scores participants assigned to their interactions with Black and White individuals. Again, these valence scores were submitted to a 3 (Experience: Students vs. Recruits vs. Officers) x 2 (Race: Black vs. White) mixed-model ANOVA. There was no significant effect found for race, $F(1, 127) = .60, p = .440, \eta^2 < .01$, and no significant Race x Experience interaction, $F(2, 127) = .21, p = .810, \eta^2 < .01$. The between-subject effect of experience was also not significant,

$F(2, 127) = 1.04, p = .357, \eta^2 = .02$. In sum, as in Study 1, even though participants reported having a higher frequency of interactions with White versus Black individuals, the interactions were rated as no different with respect to their valence.

Motivation to control prejudiced reactions scale. The external (concern about appearing prejudice) and internal (restraint to avoid dispute) subscales and overall scale results were examined. Similar to Study 1, Cronbach's α for the external scale was .72, .40 for the internal scale, and .71 for the overall scale. The mean external sub-scale score for all participants was 30.00 ($SD = 6.17$) and a significant difference was observed between the groups, $F(2, 127) = 7.38, p = .001, \eta^2 = .10$. Specifically, a difference was found between students and recruits, but not between officers and these groups. The mean internal sub-scale score for all participants was 24.28 ($SD = 3.99$) and the differences between the groups approached significance, $F(2, 127) = 2.57, p = .081, \eta^2 = .04$. The difference between recruits and officers was near significant, but there were no significant differences between students and these groups. The overall scale score for all participants was 54.28 ($SD = 8.81$) and significant differences were found between the groups, $F(2, 127) = 6.19, p = .003, \eta^2 = .09$. A significant difference was found between students and recruits, but not between these groups and officers.

Correlational and moderator analyses. Although the correlational and moderator analyses from the previous studies were not overly informative, the same analyses were nevertheless conducted in this study with the hope that it would help clarify the relationship between the cognitive load and stereotype measures, and performance on the shooting task. A summary of the results is provided in Table 13.

Table 13

Pearson Correlations between Cognitive Load Items, Stereotype Measures, Demographics, and Criterion, Sensitivity, and Reaction Time Biases for Study 2

	Criterion White Bias			Sensitivity White Bias			RT White Bias		
	Students	Recruits	Officers	Students	Recruits	Officers	Students	Recruits	Officers
Cognitive Load Items									
Perceived Difficulty	-.20	-.17	-.09	.19	-.18	-.03	.16	-.15	.08
Mental Effort Expended	-.16	-.25	-.23	-.01	-.01	-.01	.01	-.14	.11
Stereotype Measures									
IAT (D)	.23	.00	.25	-.01	.06	.11	.25	.15	.15
SRS	-.36*	-.28*	-.05	-.22	-.23	-.18	-.06	.00	.17
Adjective Checklist									
Cultural Black Stereotype	.17	-.11	.21	-.09	-.05	.31	-.21	.31*	-.24
Cultural White Stereotype	.06	-.01	-.20	-.24	-.03	.00	-.01	.09	-.38*
Personal Black Beliefs	.04	-.11	-.15	.12	-.22	-.23	.04	.03	-.23
Personal White Beliefs	.10	-.27	-.14	-.01	-.23	-.01	.03	.04	-.21

Interpersonal Interactions									
Frequency with Blacks	.14	-.13	-.09	-.17	-.04	-.10	.02	.11	.04
Frequency with Whites	-.07	.13	.18	-.19	-.08	.05	.02	.03	.15
Valence with Blacks	.22	-.03	-.02	-.16	.08	.13	-.12	-.10	.12
Valence with Whites	.22	-.16	-.18	.22	-.03	-.05	.05	-.13	.23
Motivation to Control Prejudice									
External Sub-scale	.10	-.08	-.01	.12	-.17	-.14	.31*	-.16	-.15
Internal Sub-scale	.05	.04	.03	-.12	-.11	.26	-.13	-.25	-.23
Total Scale	.10	-.03	.00	.04	-.15	.04	.17	-.22	-.23
Demographics									
Age	.06	.00	.02	-.04	-.10	.15	.04	.05	-.16
Gender	.05	.17	-.04	-.01	.07	.26	.12	-.23	.12
Minority	-.39*	.40**	.05	-.01	.11	.03	.10	.20	-.13
Education Level	-.03	-.09	.15	-.18	-.18	.23	-.11	-.25	.04

Note. * = $p < .05$, ** = $p < .001$; point-biserial correlations were used for the gender and minority variables.

As in Study 1, to conduct the correlational and moderator analyses, it was first necessary to calculate various indices of racial bias. To be consistent with the results thus far, an index of White bias was calculated for criterion, sensitivity, and RT in the same manner described in Study 1. In each case, higher values on these indices represent a greater shooting bias towards White targets. The correlational analyses revealed only six significant correlations (out of a possible 171) at the level of $p < .05$ and one at the level of $p < .001$. Consistent with Study 1, and previous research conducted by Correll et al. (2007b), the correlations do not appear to follow a particularly meaningful pattern.

Moderator analyses were again conducted using hierarchical linear regression. Specifically, participants' MCPRS score were examined to determine if they moderated the relationship between the SRS and racial bias or between the Black personal stereotypes derived from the adjective checklist and racial bias. Results were similar to Study 1 and previous research (Correll et al., 2002; Glaser & Knowles, 2008), in that the MCPRS responses did not moderate the relationship between these explicit measures and any of the racial bias indices.

Discussion

The main goals in Study 2 were to determine if the White bias found in Study 1 would replicate and to investigate if scene complexity would magnify this bias given that scene complexity should decrease one's ability to rely on controlled processes (i.e., basing decisions on weapon presence). Secondary goals of Study 2 were to examine how police experience related to racially biased shooting decisions when scene complexity was manipulated and to explore if various cognitive load and stereotype measures relate to shooting performance.

Explanation of Shooting Performance Results

Signal detection. Based on the results of Study 1, it was proposed that a White bias would be found with respect to the criterion (c) and sensitivity (d') estimates (hypothesis 1a and 1d), that c and d' would vary as a function of scene complexity (hypothesis 1b and 1e), and that a significant Race x Complexity interaction would be found, whereby the White bias (but not necessarily the Black bias) would be magnified on high complexity trials (hypothesis 1c and 1f). These hypotheses were partially supported by the signal detection results.

Given the results found in Study 1 the analysis of c was expected to reveal a significant race effect. However, this was not found to be the case. In fact, participants had a significant *shoot* bias for both White and Black targets, although they set slightly stricter thresholds for Black targets. In addition, the expected effect of scene complexity was not found in this study. Instead, c was found to be roughly the same (on average) across low and high complexity trials. While the expected Race x Complexity interaction was found, the results produced some surprising findings. While participants did act as expected when encountering White targets (showing a stronger *shoot* bias on high versus low complexity trials) the opposite was actually true for Black targets (rather than scene complexity having little effect, participants actually showed a stronger *shoot* bias for Black targets on low versus high complexity trials).

What explains this interaction effect? As argued previously, participants presumably have reduced attentional resources on high complexity trials, and are thus unable to rely heavily on controlled processing (Fiske & Russell, 2010). Under such conditions, participants would be more likely use their stereotypes as heuristic devices to

help make shooting decisions (Bodenhausen, 1990). This line of thinking can explain the lower (more lenient) c values for White targets on the high complexity trials. By extension, if participants generally hold positive stereotypes towards Black individuals within the context of the shooting task, this line of thinking could also explain the higher c values found for these targets on the high complexity trials.

While logical, two matters complicate this argument when it is applied to the Black targets. One issue to consider is the fact that the criterion set for Black targets consistently favoured a *shoot* response across both high and low complexity trials, indicating that these participants must not possess particularly positive stereotypes of Black individuals (as demonstrated by the other stereotype measures). The other complicating factor is that previous research does not consistently support the idea that positive stereotypes will be relied on to the same extent as negative stereotypes under conditions of high complexity. For example, when Correll et al. (2002) manipulated task complexity by varying the length of their response window, their findings sometimes indicated that positive White stereotypes were relied on under conditions of heightened complexity (Study 2), but this was not always the case (Study 1). Clearly, more research is needed to explore this issue.

In contrast to the analysis of c , the sensitivity analysis showed a clear race effect, which is consistent with hypothesis 1d, and Study 1. Specifically, participants had a lower sensitivity score for White compared to Black targets, presumably because they were simultaneously processing stereotypic information about White targets while also trying to determine if the White targets were holding guns. Also in contrast to the analysis of c , but as expected by hypothesis 1e, a complexity effect was found for

sensitivity. The higher sensitivity scores observed on low compared to high complexity trials can most likely be explained by the fact that it is easier for participants to process stimuli (and therefore identify weapons) when fewer distracter items are present in a scene (Forster & Lavie, 2008). As with the criterion results, there was a Race x Complexity interaction, but this time the results matched perfectly with expectations. More specifically, participants exhibited significantly lower sensitivity scores when encountering high versus low complexity scenes, but this was only the case for White targets. Again, this result is best explained by the argument that, when participants' ability to use controlled processing is diminished under conditions of high complexity, this causes them to rely on a negative White (dangerous) stereotype.

Although not the primary goal of Study 2, the effect of police experience was also examined in this study. The criterion analyses revealed no experience effect. In contrast, analyses examining sensitivity indicated that, overall, officers and recruits were significantly better than students at distinguishing armed from unarmed targets. Importantly, however, each of these groups demonstrated the same sort of White shooting bias observed in Study 1 and increasing scene complexity appeared to exacerbate this bias for each group.

Reaction time. As expected in hypothesis 2a, a complexity effect was found when reaction times were examined, which showed that participants were faster to correctly respond when exposed to low versus high complexity scenes. As with the sensitivity analysis, this most likely reflects the fact that weapon presence can be determined more quickly when fewer distracter items are present in a scene. While no effect of race was found (or expected) for reaction times, the object effect that emerged in

Study 1 was also found in the current study. Again, participants responded faster to armed targets than unarmed targets, presumably because they felt more threatened when targets were armed.

There was no support found for hypothesis 2b, which anticipated a Race x Object interaction whereby armed White targets would be shot quicker than armed Black targets, but that unarmed Black targets would not be shot quicker than unarmed White targets. While this hypothesis makes sense logically and would arguably be expected given some of the signal detection results, this interactions was not significant in Study 1 either.

However, other interactions were significant. Interestingly, one of the significant interactions was the Race x Complexity interaction, which showed that responses on low complexity trials were significantly faster than on high complexity trials, but only for White targets. This suggests that our participants' ability to make accurate responses quickly on high complexity trials was impaired, but only for White targets, presumably indicating that they were distracted by the race of the White targets when they trying to determine if the targets are armed.

Lastly, while there was no main effect of experience on reaction times, there was a significant 3-way interaction between Race x Complexity x Experience with students responding significantly faster than recruits to Black targets on low complexity trials and to White targets on high complexity trials. No clear reason for these results was hypothesized and given the randomness of the significant simple effects this finding seems most likely due to sampling error.

Error rates. As expected in hypothesis 3a, participants made more errors when responding to high complexity compared to low complexity scenes. This is most likely

because it was more difficult to make accurate responses in the presence of distracter items. Interestingly, there was also a race and experience effect, with more errors being made for White targets compared to Black targets, and with students making more errors than recruits and officers.

Surprisingly, and in contrast to what was expected in hypothesis 3b, the Race x Object interaction was not significant, indicating that the error rate for targets of different races did not differ by object type. However, a significant Race x Complexity interaction was found, which showed that participants made more errors on high complexity versus low complexity trials, but only for White targets. Thus, a consistent picture is beginning to emerge. Irrespective of whether White targets are armed or unarmed, participants seem to make a larger number of errors when encountering White targets, but they do so to a greater extent in high versus low complexity conditions.

Importantly, the significant Race x Object x Complexity interaction found for error rates (in support of hypothesis 3c) indicates that error rates will increase even further in high complexity conditions when encountering stimuli that matches the White danger stereotype that the participants seem to hold. More specifically, the participants made more errors when encountering unarmed White targets compared to unarmed Black targets, but only under high complexity conditions. Clearly, on high complexity trials where cognitive resources are more depleted, what is stereotypical for the participants (White *armed* targets and Black *unarmed* targets) is not consistent with previous research (Correll et al., 2002, 2007a; Plant & Peruche, 2005; Plant et al., 2005; Watt, 2010).

Cognitive load ratings and stereotype measures. Based on the results from Study 1 and those reported by Correll et al. (2002), it was not surprising that the cognitive

load ratings and implicit/explicit stereotype measures did not provide any clear explanations for the shooting results. Some of the descriptive results from the stereotype measures were consistent with the overall shooting results in the sense that negative Black stereotypes were sometimes absent (e.g., personal stereotypes as measured by the adjective checklist did not vary across the races, nor did the valence of participants' interactions with Black and White individuals). However, no meaningful pattern of results emerged when the various stereotype measures were correlated with the indices of racial bias and the MCPRS was not found to moderate the relationship between the explicit stereotype measures and racial bias. All of the various reasons that were presented in Study 1 for the absence of significant results are also relevant here.

CHAPTER 5

The Effectiveness of an Implementation Intention Strategy for Reducing a Racial Bias in a Simulated Shooting Task (Study 3)

Purpose

Given the robustness of the White bias observed in this dissertation, the next study is designed to determine whether a practical training strategy could be used to minimize the racial bias. More specifically, following a procedure examined by Mendoza et al. (2010), Study 3 examined whether a distraction-inhibiting implementation intention to “ignore race” when presented with armed and unarmed targets would decrease racially biased shooting responses. It is hypothesized that this strategy should work because it will reduce the automatic activation of racial stereotypes.

Method

Participants

A total of 120 undergraduate participants from Carleton University completed Study 3 (Training = 60, Control = 60). The gender breakdown of participants included 57 males and 63 females, with an average age of 19.92 ($SD = 2.32$). The ethnicity of the sample was as follows: White = 66, Black = 10, Asian = 17, Middle Eastern = 11, Other = 8, No response = 8. There were no significant differences across the conditions with respect to gender, $\chi^2 = .03, p = .855$, minority status, $\chi^2 = 1.32, p = .251$, or age, $t(117) = -.26, p = .796$.

Measures

The measures used in Study 3 remained the same as Study 1 and 2.

Procedure

The procedure for Study 3 was similar to the procedure used in Study 1 with one exception, which related to the instructions for the shooting task. All participants received the general instructions explaining what was required of them on the shooting task prior to completing their practice trials:

You will be exposed to a simulated shooting task where you will be asked to make shoot/don't shoot decisions based on whether or not you believe you are facing an armed or unarmed target. Please try to go as fast as possible, while also being as accurate as possible.

These were the only instructions the control group received. However, the training group received additional instructions. Specifically, these participants were shown a slide, which informed them that:

Studies on perceptual readiness have shown that a certain mental exercise can help individuals to have more control over their behavioural responses. If you make a resolution to respond in a particular way, you will be able to respond in that manner.

The instructions continued and stated:

You should be careful not to let other features of the targets affect the way you respond. In order to help you achieve this, research has shown it to be helpful for you to adopt the following strategy: "If I see a person, then I will ignore his race!"

Following standard procedure, participants were then asked to mentally repeat this message three times and type the message into an open-ended response box to ensure that the strategy was processed (Mendoza et al., 2010). After processing these instructions, participants completed the test trials.

Hypotheses

As with Study 2, data related to participants' cognitive load and stereotype measures were still collected and analyzed, however the focus of Study 3 was on the effect of implementation intentions on shooting performance. The following hypotheses were tested in Study 3:

1. (a) The criterion for White targets will be lower (more lenient) than for Black targets.
- (b) The criterion will vary as a function of condition, such that the control group will set a lower criterion than the training group.
- (c) The analysis of the criterion will reveal a Race x Condition interaction with the control group setting a lower criterion for White targets compared to Black targets, but the training group setting a similar criterion for both Black and White targets.
- (d) Participants will exhibit higher levels of sensitivity for Black versus White targets.
- (e) The analysis of sensitivity will reveal a Race x Condition interaction with the control group showing lower levels of sensitivity for White targets compared to Black targets, but the training group showing similar levels of sensitivity for Black and White targets.

2. (a) Reaction time will decrease as a function of condition, such that the control group will make slower correct responses than the training group.
(b) There will be a Race x Object interaction for reaction times. Specifically, it is predicted that armed White targets will be shot quicker than armed Black targets and participants will not shoot unarmed Black targets more quickly than unarmed White targets.
(c) There will be a Race x Object x Condition interaction for reaction times, such that the control group is expected to respond faster to armed White targets (and unarmed Black targets) compared to armed Black targets (and unarmed White targets). In contrast, there will be no difference in reaction times for the training group when encountering armed Black and White targets, or unarmed Black and White targets.
3. (a) Error rate will vary as a function of condition, such that the control group will make more errors than the training group.
(b) There will a Race x Object interaction for errors. It is predicted that armed White targets will be shot more often than armed Black targets and participants will not shoot unarmed Black targets more often than unarmed White targets.
(c) There will be a Race x Object x Condition interaction for errors, such that the control group will more often shoot armed White targets (than armed Black targets) and more often not shoot unarmed Black targets (than unarmed White targets). In contrast, there will be no difference in errors rates for the training group when encountering armed Black and White targets, or unarmed Black and White targets.

Results

Preliminary Data Screening

As in Study 1 and 2, the shooting data (e.g., errors, RT)¹⁹, the cognitive load and explicit/implicit stereotype measures, and the demographic information were examined for the following issues: missing data, outliers, normality, and homogeneity of variance. Essentially, the same results found in Study 1 and 2 were also found in Study 3. Missing data was not a significant issue for any of the data; outliers were an issue for the error data only, with only one outlier (determined by having a z-score ± 3.29) needing to be substituted for a value one standard deviation higher than the next most extreme score in the distribution (Tabachnick & Fidell, 2007); normality was an issue for some variables, but the analysis of log transformed data produced the same results as non-transformed data; and homogeneity of variance was not an issue.

Main Analyses

Signal detection. Correct and incorrect responses (i.e., excluding timeouts) were used to conduct signal detection analyses. The criterion estimate, c , was calculated separately for Black and White targets. The sensitivity estimate, d' , was also calculated for both White and Black targets separately. These signal detection estimates were then submitted to separate 2 (Condition: Training vs. Control) $\times$ 2 (Race: Black vs. White) mixed-model ANOVAs, with condition being a between-subjects factor and race being a within-subject factor. A summary of the data is provided in Table 14.

¹⁹ The signal detection estimates of c and d' are based on error data, and so the screening of this data is embedded in the error data screening.

Table 14

Means and Standard Deviations of Decision Criterion and Sensitivity Estimates for Study 3

	Training		Control	
	Black	White	Black	White
Signal Detection	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Criterion (<i>c</i>)	-.02(.29)	-.03(.04)	.05(.29)	-.01(.17)
Sensitivity (<i>d'</i>)	2.46(.85)	2.23(1.12)	2.53(.81)	2.20(1.11)

Criterion analysis. Recall that placing the criterion at 0 indicates no greater tendency to make a *shoot* response than a *don't shoot* response. Deviations from zero in a positive direction indicate a bias favoring the *don't shoot* response and deviations in the negative direction indicate a *shoot* bias. In opposition to hypothesis 1a, the analysis of *c* revealed no main effect of race, $F(1, 118) = 1.26, p = .264, \eta^2 = .01$, although as in all previous studies the trend was that the mean *c* for Black targets was higher ($M = .01, SD = .29$) than for White targets ($M = -.02, SD = .30$) (see Figure 24). There was also no support for hypothesis 1b, which had anticipated that the control group would set a lower shooting criterion than the training group, however the main effect for condition was not significant, $F(1, 118) = 2.49, p = .117, \eta^2 = .02$. Similarly, there was no support for hypothesis 1c whereby there was no significant Race x Condition interaction, $F(1, 118) = 1.17, p = .283, \eta^2 = .01$.²⁰

²⁰ Results from one-sample t-tests showed that *c* scores for the Black targets did not differ from 0, $t(119) = .51, p = .609, 95\% \text{ CI } [-.04, .07]$, whereas the *c* scores for the White targets approached significance, $t(118) = -1.74, p = .084, 95\% \text{ CI } [-.04, .00]$. Separate analyses of *c* for each condition revealed one significant difference for the training group with White targets, $t(59) = -4.37, p < .001, 95\% \text{ CI } [-.03, -.01]$.

Figure 24. Decision criterion estimates representing the placement of shoot/don't shoot criteria for Black and White targets as a function of condition for Study 3.

Sensitivity analysis. Higher values of d' indicate that participants are able to effectively discriminate between armed and unarmed targets. The analysis of d' showed that there was a significant effect of race, $F(1, 118) = 8.55, p = .004, \eta^2 = .07$. Consistent with hypothesis 1d, and also the results of Study 1 and 2, the race results showed that sensitivity was higher for Black targets ($M = 2.49, SD = .83$) than White targets ($M = 2.21, SD = 1.11$) (see Figure 25). Once again this finding appears to demonstrate that participants struggle more with identifying armed White targets. The results did not show a main effect for condition, $F(1, 118) = .02, p = .890, \eta^2 < .01$, and in opposition to hypothesis 1e, the Race x Condition interaction was also not significant, $F(1, 118) = .32, p = .576, \eta^2 < .01$. Despite expectations, it does not appear that the implementation intention reduced racially bias shooting decisions (at least for sensitivity estimates).

Figure 25. Sensitivity estimates for distinguishing between armed and unarmed Black and White targets as a function of condition for Study 3.

Reaction time. Reaction times for each participant from all correct responses were averaged separately for each type of target (i.e., Black and White) and each type of object (i.e., armed and unarmed). Averages were analyzed using a 2 (Condition: Training vs. Control) x 2 (Race: Black vs. White) x 2 (Object: Armed vs. Unarmed) mixed-model ANOVA with repeated measures on the latter two factors. A summary of the data is provided in Table 15.

Table 15

Means and Standard Deviations of Reaction Times for Study 3

	Training		Control	
	Black	White	Black	White
Reaction Time	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Armed				
Milliseconds	482.94(55.57)	488.57(52.49)	492.20(24.93)	490.35(24.43)
Log Transform	6.17(.20)	6.18(.17)	6.20(.05)	6.20(.05)
Unarmed				
Milliseconds	521.43(57.73)	524.05(60.91)	522.96(26.49)	531.66(27.36)
Log Transform	6.25(.20)	6.25(.19)	6.26(.05)	6.28(.05)

In contrast to expectations in hypothesis 2a, the effect of condition was not significant when analyzing reaction times, $F(1, 118) = .45, p = .502, \eta^2 < .01$. However, in contrast to the previous two studies, there was a significant main effect for race, $F(1, 118) = 6.69, p = .011, \eta^2 = .05$, whereby participants were faster to correctly respond to Black targets ($M = 504.88, SD = 47.16$) than White targets ($M = 508.66, SD = 48.02$) (see Figure 26). This suggests that participants may have been attending to a stereotype for White targets, but not Black targets, which decreased their ability to make correct decisions quickly. In addition, there was also a significant main effect for object, $F(1, 118) = 358.57, p < .001, \eta^2 = .75$, which indicated that participants were faster to *shoot* when targets were armed ($M = 488.51, SD = 41.90$) than to *not shoot* when targets were

unarmed ($M = 525.02$, $SD = 45.96$). This is consistent with the findings reported in Study 1 and 2, and previous research (e.g., Correll et al., 2007; Watt, 2010; Yoshida, 2009).

Figure 26. Reaction time for the type of shooting trial as a function of condition.

The Race x Object interaction hypothesized in hypothesis 2b was not significant, $F(1, 118) = 1.25$, $p = .266$, $\eta^2 = .01$, nor were the other two-way interactions: Race x Condition, $F(1, 118) = .06$, $p = .810$, $\eta^2 < .01$, and Object x Condition, $F(1, 118) = .06$, $p = .807$, $\eta^2 < .001$. However, the three-way interaction expected in hypothesis 2c between Race x Object x Condition was found, $F(1, 118) = 4.05$, $p = .047$, $\eta^2 = .03$ (see Figure 27). With that being said, an analysis of the pattern of reaction times only provided partial support for the hypothesis.

Participants in the training group acted exactly as expected, showing no difference in their reaction times to armed Black and White targets, or unarmed Black and White targets (although participants in the training group did respond faster overall to armed targets, irrespective of their race). While the control group also acted as expected in relation to unarmed targets, by making correct responses faster when encountering

unarmed Black ($M = 522.96$, $SD = 26.49$) targets compared to unarmed White targets ($M = 531.66$, $SD = 27.36$). However, the control group did not exhibit a significant difference in their reaction times to armed Black and White targets (again, as with the training group, participants in the control group did respond faster overall to armed targets, irrespective of their race).

Figure 27. Reaction time for the object type as a function of race for the training and control groups.

Error rates. Errors were calculated for each participant and error rates (i.e., mistakes/total-timeouts) were calculated for each type of target (i.e., Black and White) and object (i.e., armed and unarmed). The mean percentage of incorrect responses for the entire sample was 11.74 and the mean number of timeouts was 11.30. These rates are consistent with those of Study 1 and Study 1b, but obviously different from those in Study 2, which incorporated low complexity stimuli (that resulted in fewer errors). A summary of the data is provided in Table 16.

Table 16
Means and Standard Deviations of Error Rates for Study 3

	Training		Control	
	Black	White	Black	White
Error Rates	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Armed				
Error Rates	.13(.11)	.11(.12)	.13(.11)	.11(.10)
Log Transform	.12(.10)	.10(.10)	.12(.09)	.10(.09)
Unarmed				
Error Rates	.14(.12)	.17(.14)	.11(.10)	.16(.12)
Log Transform	.12(.10)	.15(.12)	.10(.09)	.15(.10)

Participants' error rates were subjected to a 2 (Condition: Training vs. Control) x 2 (Race: Black vs. White) x 2 (Object: Armed vs. Unarmed) mixed-model ANOVA with repeated measures on the latter two factors. In opposition to hypothesis 3a, there was no significant effect of condition, $F(1, 118) = .10, p = .759, \eta^2 < .01$, nor was there a significant effect of race, $F(1, 143) = 2.10, p = .150, \eta^2 = .02$. However, there was a significant effect for object, $F(1, 118) = 8.27, p = .005, \eta^2 = .07$, whereby participants made fewer errors for armed ($M = .12, SD = .11$) compared to unarmed targets ($M = .15, SD = .12$) (See Figure 28). These results confirm those found in Study 1b and they are in the same direction as the trends found in Study 1 and 2.

Figure 28. Error rates for the type of shooting trial as a function of condition.

There were no significant interactions for Race x Condition, $F(1, 118) = .34, p = .562, \eta^2 < .00$, or for Object x Condition, $F(1, 118) = 1.21, p = .273, \eta^2 = .01$. However, consistent with hypothesis 3b, there was a significant interaction between Race x Object, $F(1, 118) = 17.53, p < .001, \eta^2 = .13$ (see Figure 29). More specifically, participants made

more errors for unarmed White targets compared to unarmed Black targets, but more errors for armed Black targets compared to armed White targets. This pattern is consistent with the results of Study 1 and the current study, and suggest that participants find it more difficult to accurately shoot armed targets when they are Black and unarmed targets when they are White. In contrast to hypothesis 3c, the Race x Object x Condition was not significant, $F(1, 118) = .94, p = .336, \eta^2 = .01$.

Figure 29. Error rates for the object type as a function of race for Study 3.

Cognitive load items and stereotype analyses. As in all previous studies, cognitive load data, the implicit and explicit stereotype measures, the frequency and valence of participant interactions with both races, and the MCPRS findings were examined next. A summary of the data is provided in Table 17.

Table 17

Means and Standard Deviations of Cognitive Load Items and Stereotype Measures for Study 3

	Training	Control
	<i>M (SD)</i>	<i>M (SD)</i>
Cognitive Load Items		
Perceived Difficulty (/9)	5.60 (1.80)	5.43 (1.90)
Mental Effort Expended (/9)	5.93 (1.95)	6.03 (1.89)
Stereotype Measures		
IAT (D)	.44 (.37)	.37 (.36)
SRS (/31)	16.93 (3.43)	16.30 (2.76)
Adjective Checklist		
Cultural Black Stereotype (/18)	10.02 (4.64)	10.23 (4.50)
Cultural White Stereotype (/18)	5.02 (3.89)	5.95 (4.11)
Personal Black Beliefs (/18)	4.48 (3.69)	4.08 (3.56)
Personal White Beliefs (/18)	3.93 (3.58)	3.95 (3.67)
Interpersonal Interactions		
Frequency with Blacks (/5)	3.43 (1.00)	3.47 (1.05)
Frequency with Whites (/5)	4.35 (.95)	4.35 (.97)
Valence with Blacks (/5)	3.82 (.95)	3.72 (.76)
Valence with Whites (/5)	3.70 (.81)	3.68 (.75)
Motivation to Control Prejudice		
External Sub-scale (/45)	29.87 (6.05)	30.02 (5.96)
Internal Sub-scale (/40)	23.30 (3.71)	23.05 (4.04)
Total Scale (/85)	53.17 (8.45)	53.07 (8.28)

Cognitive load measures. With respect to cognitive load, no differences were found between the groups with respect to perceived difficulty, $t(118) = -.49, p = .622$, or the amount of effort expended during the task, $t(118) = .29, p = .776$. This is consistent with some previous research indicating that the use of implementation intentions does not demand a larger amount of attentional resources or effort (Brandstätter et al., 2001).

Implicit association test. As in other sections, D scores were calculated, with more positive scores indicating an implicit association between the concepts of Black-bad and White-good (and vice versa for negative scores). The average D score across conditions was .41 ($SD = .36$, range $-.49$ to 1.18), indicating a moderate implicit association between the concepts Black and bad (i.e., a moderate negative Black bias). The difference between the two groups was not significant, $t(118) = -1.06, p = .293$.

Symbolic racism scale. As outlined in the previous studies, the SRS has a total possible range of 8-31 (higher scores indicating higher levels of racism towards Black individuals). A Cronbach's α of .52 was obtained for responses, indicating a low to moderate level of internal consistency (Henry & Sears, 2002). The mean score across conditions was 16.61 ($SD = 3.11$), which is consistent with previous studies and indicates a moderate degree of racism towards Blacks. No significant difference on SRS scores was found between the training and control group, $t(118) = -1.12, p = .267$.

Adjective checklist. As in the previous studies, participants were asked to highlight adjectives that they felt characterized: (a) a cultural stereotype of Black and White individuals and (b) their own personal stereotype of Black and White individuals. The data related to cultural stereotypes was submitted to a 2 (Condition: Training vs. Control) x 2 (Race: Black vs. White) mixed-model ANOVA. There was no effect found

for condition, $F(1, 118) = .84, p = .363, \eta^2 = .01$, and no significant Race x Condition interaction, $F(1, 118) = .58, p = .446, \eta^2 < .01$. However, as in Study 1 and 2, there was a significant effect found for race, $F(1, 118) = 97.96, p < .001, \eta^2 = .45$. As illustrated in Table 17, participants again selected more negative adjectives to represent Black cultural stereotypes.

The data related to personal beliefs was also submitted to a 2 (Condition: Training vs. Control) x 2 (Race: Black vs. White) mixed-model ANOVA. As in Study 2, there was no significant effect for race, $F(1, 118) = 1.67, p = .198, \eta^2 = .01$, or condition, $F(1, 118) = .10, p = .753, \eta^2 < .01$, and no Race x Condition interaction, $F(1, 118) = .62, p = .432, \eta^2 < .01$.

Frequency and valence of interpersonal interactions. Next, the frequency and valence of participants' interactions with Black and White individuals was examined. Frequency scores were submitted to a 2 (Condition: Training vs. Control) x 2 (Race: Black vs. White) mixed-model ANOVA. As in Study 1 and 2, there was a significant effect found for race, $F(1, 118) = 50.58, p < .001, \eta^2 = .30$, with participants engaged in significantly more interactions with White than Black individuals. However, the between-subjects effect of condition was not significant, $F(1, 118) = .02, p = .898, \eta^2 < .01$, nor was the Race x Condition interaction, $F(1, 118) = .02, p = .895, \eta^2 < .01$.

The valence scores that participants assigned to their interactions with Black and White individuals were also submitted to a 2 (Condition: Training vs. Control) x 2 (Race: Black vs. White) mixed-model ANOVA. There was no significant effect found for race, $F(1, 118) = .97, p = .327, \eta^2 = .008$, or condition, $F(1, 118) = .21, p = .652, \eta^2 < .01$. The Race x Condition interaction was also not significant, $F(1, 118) = .30, p = .585, \eta^2 < .01$.

Motivation to control prejudiced reactions scale. The external (concern about appearing prejudice) and internal (restraint to avoid dispute) subscales and overall scale results were examined. A Cronbach's α of .69 was obtained for responses, indicating reasonably strong internal consistency. The overall scale score for all participants was 53.12 ($SD = 8.34$), the mean external sub-scale score was 29.94 ($SD = 5.98$), and the mean internal sub-scale score was 23.18 ($SD = 3.86$). No differences were found on the overall scale between the training and control group, $F(1, 118) = .01, p = .948, \eta^2 < .01$.

Correlational and moderator analyses. As in previous studies, correlational analyses were conducted between the above measures and indices of a White racial bias, calculated as before (higher values on these indices represent a greater bias towards White targets). A summary of the results is provided in Table 18.

Table 18

Pearson Correlations between Cognitive Load Items, Stereotype Measures, Demographics, and Criterion, Sensitivity, and Reaction Time Biases for Study 3

	Criterion White Bias		Sensitivity White Bias		RT White Bias	
	Training	Control	Training	Control	Training	Control
Cognitive Load Items						
Perceived Difficulty	.10	-.17	.07	.17	.02	-.06
Mental Effort Expended	.15	-.07	-.07	.08	.19	.08
Stereotype Measures						
IAT (D)	-.06	-.21	-.11	-.04	-.05	.19
SRS	-.05	.07	-.20	.02	-.11	-.03
Adjective Checklist						
Cultural Black Stereotype	-.13	-.11	.24	-.06	.28*	-.11
Cultural White Stereotype	-.11	-.02	.00	.13	.09	.04
Personal Black Beliefs	-.21	.06	.10	.07	.08	-.07
Personal White Beliefs	-.17	.07	.04	.27*	.06	-.08
Interpersonal Interactions						
Frequency with Blacks	-.17	.02	.24	-.03	.15	-.13
Frequency with Whites	.04	.07	.01	-.24	.11	.12
Valence with Blacks	.11	-.03	.08	-.04	.08	.02

Valence with Whites	.00	-.10	-.17	-.19	.00	.24
Motivation to Control Prejudice						
External Sub-scale	-.01	.10	.09	-.05	-.13	-.05
Internal Sub-scale	.06	.05	.02	.04	-.15	.00
Total Scale	.02	.09	.07	-.02	-.16	-.04
Demographics						
Age	.01	-.01	.01	-.09	.16	.00
Gender	-.04	.21	.04	.02	-.13	-.02
Minority	-.09	.06	-.01	-.20	-.10	.22
Education Level	-.05	.05	.02	-.15	-.05	.08

Note. * = $p < .05$; point-biserial correlations were used for the gender and minority variables.

Consistent with previous studies, the correlational analyses revealed few significant correlations and thus, shed little light on the White bias found across the shooting data. In addition, moderator analyses were again conducted using hierarchical linear regression. Specifically, participants' MCPRS score were examined to determine if they moderated the relationship between the SRS and racial bias or between the Black personal stereotypes derived from the adjective checklist and racial bias. Results were similar to Study 1 and 2 in that the MCPRS responses did not moderate the relationship between these explicit measures and any of the racial bias indices.

Discussion

This study sought to determine the effectiveness of an implementation intention training technique to decrease racial biases in simulated shootings. Specifically, unlike participants in the control group, participants in the training group were given instructions to ignore race when exposed to targets and were asked to keep this in mind when completing the shooting task. Given the White bias found in previous studies, it was expected that participants in the training group would show a reduced White bias compared to participants in the control group. As with all previous studies, a range of other measures were also collected and analyzed to see if they correlated with various indices of the White racial bias.

Explanation of Shooting Performance Results

Signal detection. Although not significant, the results supported the direction of hypothesis 1a in the sense that participants tended to adopt a more lenient *shoot* bias for White targets compared to Black targets (as in Study 1, 1b and Study 2). However, in contrast to hypothesis 1b and 1c, the implementation intention training had little impact

on the criterion set by participants, and did not make them significantly less biased in their simulated shooting decisions. This is a particularly important finding given that implementation intentions have not only been found to effectively reduce racial biases, but that they have been found to accomplish this by reducing automatic stereotype activation, which is supposed to be reflected in the criterion estimates (Gollwitzer & Schaal, 1998; Mendoza et al., 2010; Stewart & Payne, 2008).

Consistent with these results, and hypothesis 1d, the analysis of sensitivity indicated that participants had more difficulty distinguishing between armed and unarmed targets when the targets were White. Also consistent with the analysis of the criterion, but in opposition to hypothesis 1e, was the fact that the implementation intention was not effective at significantly altering this bias. In fact, with respect to sensitivity, near identical results were obtained from the control and training group.

Reaction time. In contrast to hypothesis 2a, the implementation intention had no effect on the speed of correct responses. However, several significant results did emerge when examining this outcome variable. For example, consistent with all previous studies, the reaction time results indicated that participants were faster to *shoot* armed targets than to *not shoot* unarmed targets, reasons for which have already been presented (see Study 1). However, there was no support for hypothesis 2b, which anticipated a Race x Object interaction.

Analyses of reaction times also revealed an unexpected significant race effect, whereby participants were faster overall to correctly respond to Black versus White targets. This is the first time this result has been found in this series of studies and it seems to be largely driven by the control group when these participants were making

decisions on unarmed trials. This is reflected in the significant Race x Object x Condition interaction, which was predicted in hypothesis 2c. As described previously, while the training group did not respond any differently to armed Black and White targets, or unarmed Black and White targets, the control group did respond differently to targets depending on their race. Specifically, on unarmed trials, these participants made slower *don't shoot* decisions when encountering White targets versus Black targets, presumably because unarmed White targets do not fit their stereotype of dangerous White targets. Interestingly, differences were not observed when participants in the control group had to make *shoot* decisions for armed White and Black targets.

Error rates. Analyses did not support hypothesis 3a, such that there was no main effect for condition. However, in line with Study 1 and hypothesis 3b, there was a significant Race x Object interaction (making more errors for unarmed White targets compared to unarmed Black targets, and more errors for armed Black targets compared to armed White targets). Importantly, as indicated by the lack of support for hypothesis 3c of the Race x Object x Condition interaction, providing participants with implementation intentions did not result in a significant decrease in this White shooting bias.

Cognitive load ratings and stereotype measures. As with all previous studies, the cognitive load ratings and stereotype measures did not help clarify why a White shooting bias exists.

Why was the Implementation Intention Ineffective?

In addition to confirming the presence of a White shooting bias, the most important finding to emerge from Study 3 is the fact that the implementation intention training proved ineffective at reducing this bias. In fact, the results from the current study indicate that participants in the training group did not ignore race and, as a result, performed very much like participants in the control group. This is an interesting finding, which becomes even more intriguing, when one considers that previous researchers have successfully used implementation intentions to reduce the presence of established racial stereotypes (e.g., Gollwitzer & Schaal, 1998; Mendoza et al., 2010; Stewart & Payne, 2008; Webb, Sheeran, & Pepper, 2011), and they have done so using implementation intentions that were very similar to the one used in this study (i.e., *if I see a target, then I will ignore his race*). In the discussion that follows, several reasons are presented for why the implementation intention used in the current study was not effective at reducing racially biased shooting decisions.

The type of implementation intention used. One possibility is that the distraction-inhibiting implementation intention used in this study was not the ideal type of training to reduce the White shooting bias. Recall that this type of implementation intention is designed to inhibit the initial perception of potentially biasing stimuli, thus reducing the automatic processing of a stereotype. While research has demonstrated that such implementation intentions can be effectively used to reduce biased responding by reducing the automatic activation of stereotypes (e.g., Mendoza et al., 2010; Stewart & Payne, 2008), this type of implementation intention clearly failed to reduce the participants White bias.

Rather than relying on a distraction-inhibiting implementation intention, such as “If I see a person, *then I will ignore his race!*”, perhaps a more effective approach would be to use response-facilitating implementation intentions, as this type of implementation intention is more specific and enhances goal attainment by promoting the execution of a desired action. For instance, participants could be provided with instructions such as, “If I see a person with a gun, *then I will shoot!*” or “If I see a person with a neutral object, *then I will not shoot!*”. In contrast to the distraction-inhibiting strategy used in the present study, these implementation intentions provide straightforward directions tangible behaviours in response to specific environmental cues (a gun or a neutral object) in an attempt to enhance controlled processing (Mendoza et al., 2010). Research has shown that specific implementation intentions are more effective than ambiguous ones and thus, making these types of changes to the implementation intention could have the desired effect (Webb & Sheeran, 2007).²¹

The implementation intention delivery. Another contributing factor to the lack of efficacy of the implementation intention may be the way in which the implementation intention was delivered to participants. Recall that it was presented on one slide on a computer screen right before the shooting trials and right after the informed consent form was completed (a different font was used to promote saliency). While participants were also asked to mentally repeat the message three times and type the message into an open-ended response box (as was done by Mendoza et al., 2010), it may still be that the implementation intention was not rehearsed to the extent needed for it to impact shooting

²¹ It is important to note that earlier the argument was made for the value of training strategies that reduce the activation of automatic stereotypes, and this is still the case. However, clearly, if it is not possible to develop such strategies, then the use of training strategies to enhance controlled processing (i.e., response-facilitating implementation intentions) may have to be used instead.

performance, or was not recalled or implemented during the shooting task. Certainly, previous research has shown that retaining and implementing this training strategy is not a trivial task (Einstein, McDaniel, Williford, Pagan, & Dismukes, 2003; McDaniel & Scullin, 2010).

While it would obviously be difficult to ensure that future participants are processing, fully understanding, and actually thinking about implementation intentions during the shooting task, steps can be taken to increase the chance of these things happening. For example, one strategy to improve the retention of the implementation intention during times of delay might be to periodically reactivate the intention with mental rehearsal (Chasteen, Park, & Schwarz, 2001). In future, it may be necessary to give the training group several breaks throughout the shooting task trials to pause, in order to rehearse the implementation intention.

Individual differences. Finally, research has suggested that goal pursuit can be highly influenced by a range of individual differences that might exist across participants. Thus, one reason why the implementation intentions in this study were ineffective may be that some important characteristics were present (or absent) in the sample. For instance, Budden and Sagarin (2007) found that implementation intentions were less effective for a group of socially prescribed perfectionists, whereas other research looking at how this strategy might be used to reduce stereotyped responding has suggested that the effect of implementation intentions is strengthened when individuals have high motivation to change their stereotypical responses (Gollwitzer & Schaal, 1998).

While there is no reason to believe the current sample had an inordinate number of perfectionists, it is perhaps possible that participants in the student sample were not

intrinsically motivated to act in an unbiased, non-stereotypical manner on the shooting task (although extrinsic motivation may have been impacted by the course credits gained and the potential for winning a monetary prize, these issues would not impact intrinsic motivation). Conducting the current study using a sample of police officers would be potentially interesting, because these individuals may possess more intrinsic motivation than the students to change their stereotypic responses, given their vested interest in this topic.

CHAPTER 6

General Discussion

As its primary goal, the current dissertation sought to determine the influence of target race on the split-second shooting decisions made by Canadian participants within the context of a simulated shooting task. Despite some indirect evidence from Canadian research that a strong Black bias may not be found, it was initially hypothesized, on the basis of U.S. research, that there would be a shooting bias against Black targets, at least with participants that lacked police experience (Study 1). A second goal of the current dissertation was to examine whether factors that have previously been shown to influence racially biased responding on tasks like the shooting task would impact the racial biases exhibited by the participants tested in the current studies. More specifically, scene complexity was examined to determine if this factor would exacerbate any racial biases that were observed (Study 2) and this was followed by an examination of one particular training strategy, the use of implementation intentions, to determine if this training would reduce any racial biases that were observed (Study 3). While each of these studies has been discussed in detail already, this section will briefly highlight the main findings that emerged from this dissertation and discuss some limitations of the research and useful directions for future research.

Evidence for a White Bias Across Students and Police Professionals

In contrast to all previous research from the U.S. that has examined the influence of target race on shooting decisions, Study 1 found evidence for a White bias across participants who varied with respect to their level of police experience. Such a bias towards “in-group” members (the majority of participants were White) is relatively

uncommon in social psychological studies of stereotypes, with “out-group” biases obviously being more common (Brewer, 1999; Fiske, 1998; Hewstone, Rubin, & Willis, 2002; Miller, Maner, & Becker, 2010). However, evidence of in-group biases is not unheard of, and has been reported in both the U.S. (Marcus-Newhall, Blake, & Baumann, 2002) and Canada (Bagby et al., 1994; Fitzgerald et al., 2011). In addition, as was highlighted in the literature review, studies showing an absence of out-group biases (but not necessarily in-group biases) are becoming more common in Canada (e.g., Lant, Clow, & Cutler, 2011; Maeder & Saliba, 2011).

This literature suggests there may be cultural differences between Canada and the U.S. that might explain why the results presented in this dissertation differ so drastically from the results presented in U.S. research (i.e., Canadians may not possess the same negative stereotypes towards Black individuals). However, an exploration of these issues was deemed beyond the scope of this dissertation. Instead, the goal here was to determine whether the White bias found in Study 1 was reliable and robust; something that is clearly needed before dedicating time to understand the root cause of such a bias. The results of Study 1b confirmed the presence of a White shooting bias (or at least strong trends in this direction) and showed that the bias can be exhibited across drastically different conditions. For example, a White bias was present in the shooting responses of participants regardless of whether they were told to use or avoid race as a decision making heuristic, and even when the issue of race was not mentioned in the instructions for the shooting task.

The fact that the White bias in Study 1 (and 2) was present across all participant groups, regardless of the level of police experience associated with the group, also speaks

to the robustness of this bias. As already discussed, this finding differs from the results reported in some research from the U.S. (e.g., Correll et al., 2007a), although it is consistent with other research (e.g., Plant & Peruche, 2005). One of the potential reasons proposed for the lack of significant results with respect to police experience is the same explanation offered by Plant and Peruche (2005). Given the low level of ecological validity attached to the shooting stimuli on this shooting task, it is likely that the stimuli failed to activate the necessary shooting schemas for the police officer participants (assuming that such schemas do in fact exist) that would have been necessary to perform in an unbiased manner.

Factors that Compound the White Shooting Bias

Drawing on dual process theory, which suggests that responses to stereotypes have an automatic and controlled component, Study 2 examined whether or not the White shooting bias observed in Study 1 and 1b would be magnified under conditions of high complexity. More specifically, it was anticipated that the addition of distracter items in the background scenes on which targets were presented would strain attentional resources and result in participants being less able to rely on controlled processing within the available response window (i.e., scanning the scene to identify weapon presence). It was further anticipated that an inability to rely on controlled processing would increase the likelihood that participants would rely on automatically activated stereotypes to make shooting decisions, thus resulting in a White shooting bias. Results from Study 2 showed that this was indeed the case. The White shooting bias increased on high versus low complexity trials, largely because controlled processing was hampered, thus leaving automatic processes to be relied upon.

This is an important finding theoretically because it speaks to how stereotypes operate and sheds light on factors that might influence their expression. However, the finding also has interesting practical implications. For example, the fact that scene complexity appears to increase biased responding on the shooting task is important because scene complexity is a naturally occurring factor in the real world settings in which police officers work. The results of Study 2 clearly suggest that if the scenes police officers encounter are particularly complex (e.g., contain many background distracters) racially biased shooting responses, specifically a White shooting bias in Canada, may become particularly problematic.

If such a result is replicated in the future, and extended to show that other naturally occurring factors (e.g., short response windows) can also influence one's ability to intentionally override biased responding through controlled processing, then this research may have implications for use-of-force training as well. Specifically, these results would suggest that trainers may need to worry less about enhancing the ability of their trainees to use controlled responding in lethal force encounters (given that police officers will not be able to control the likelihood of complexity-raising factors being encountered) and perhaps focus more on making sure that racial stereotypes are not activated in the first place.

The Failure of the Implementation Intention

Study 3 examined such a training strategy in the form of a distraction-inhibiting implementation intention. Previous research has demonstrated that these types of implementation intentions can reduce racially biased responding, and that they can do so by reducing the automatic activation of racial stereotypes (as opposed to enhancing one's

controlled responding; Mendoza et al., 2010). Unfortunately, the results of Study 3 did not show the same sort of positive results found in some previous studies. In fact, the implementation intention that was used in Study 3 had virtually no effect on the shooting performance of participants; participants in the implementation intention group and the control group essentially showed a White shooting bias to the same degree, and the implementation intention certainly did not decrease the degree to which automatic stereotype activation was taking place. As already stated, changes to the implementation intention (in the way it was phrased and delivered) in the future may result in different findings, but the results of Study 3 were discouraging.

The Lack of a Relationship Between Stereotype Measures and Shooting Bias

Despite the fact that few researchers have been able to identify any factors within their participants that predict racial biases in shooting performance (e.g., Correll et al., 2002, 2007a), the series of studies presented within this dissertation also examined how a range of cognitive load and stereotype measures relate to shooting performance, specifically the White racial bias that emerged from these studies. Unfortunately, as with previous studies, the analyses of these measures did little to explain the White shooting bias. In fact, no meaningful results seemed to emerge from any of the studies with respect to these additional measures.

For instance, despite what we expected, cognitive load ratings did not differ in any meaningful way across participants with and without police experience, nor did they relate to participants' racial biases. Also, the explicit and implicit stereotype measures revealed no meaningful findings. In fact, participants' responses on many of these measures consistently found a moderate Black bias, rather than a White bias, with a few

notable exceptions (personal stereotypes, as measured using the adjective checklist, and the valence of interactions with Black and White individuals). However, despite the fact that participants tended to define their personal stereotypes of Black individuals in almost the same way as their personal stereotypes of White individuals, and rated the valence of their interactions with Black individuals the same as their interactions with White individuals, these measures did not correlate with any index of racial bias on the shooting task.

Of course the obvious question to emerge from these analyses is why none of these measures correlated with the indices of racial bias derived from the shooting results. As highlighted throughout the previous discussion sections, the reasons probably vary as a function of the measure. For example, it is likely that the explicit stereotype measures did not correlate with the various indices because they are heavily biased by socially desirable responding (Fazio & Olsen, 2003). With respect to the IAT, which is less susceptible to socially desirable responding, it is possible that the lack of significant correlations reflects the fact that the IAT measures something that is unrelated to performance on the shooting task. For example, it has been argued that the IAT is more a measure of cultural stereotypes than personal stereotypes (Karpinski & Hilton, 2001; Olson & Fazio, 2004) where the opposite is arguably true of the shooting task. An equally plausible explanation for the lack of relationship between the IAT and shooting performance is that the IAT used across the current set of studies was not measuring constructs that were relevant to the shooting task (e.g., whether Blacks and Whites can be considered “good” and “bad” rather than “dangerous” and “safe”). Perhaps IAT results will prove more useful in the future if a different version of the IAT is used.

Limitations and Future Directions

Efforts were made in this dissertation to replicate previous shooting studies (i.e., Correll et al., 2002, 2007a). However, as with any research, there were several limitations with these studies that may have impacted the results. Many of these limitations have already been discussed (e.g., in relation to the various stereotype measures). Here the focus will be on two major limitations with the current research that deserve special attention: issues related to the lack of realism of the shooting stimuli/task and to the inability to explain the White shooting bias that emerged from the studies. As these limitations are being discussed, potential directions for future research will also be proposed.

A Lack of Realism

The current dissertation used very similar stimuli to those developed by Correll and colleagues (2002) in an attempt to replicate American findings with Canadian samples. While it was known that these stimuli were not necessarily ecologically valid (i.e., the stimuli consisted of two-dimensional, non-moving targets, holding objects in potentially non-threatening positions) communication with Correll indicated that participants in his studies (both students and police officers) did not raise any concerns with this lack of realism (J. Correll, personal communication, August 12, 2009). Similarly, the general procedure developed by Correll et al. (2002, 2007a) was also used in this dissertation (e.g., the use of desktop simulations, the length of the response window, etc.). Once again, no serious concerns were raised by participants in previous studies with respect to the realism of this procedure.

Despite the fact that concerns were not raised about the realism of the shooting stimuli or shooting task in previous studies, various concerns were raised by participants taking part in the current set of studies, particularly the police officers. All of the issues that were raised could potentially impact the results obtained in the current studies and influence the degree to which the results generalize to real world settings where police officers have to make lethal force decisions.

Unsurprisingly, one of the key concerns raised by the officers regarding the shooting stimuli was that the targets were static and that several of the armed targets were holding guns in non-threatening positions (i.e., up in the air, at their side). This meant that despite the fact that targets were armed, some officers did not feel justified in making a *shoot* response. In addition, several officers reported that the response window used in the studies (630ms) was too short and did not reflect the reality of actual lethal force encounters. Whether this is true is debatable. For example, while split-second shooting decisions by police officers may be rare in some jurisdictions (J. Zeyen, personal communication, March 3, 2010); evidence does exist that such decisions do have to be made (Sharps, 2010).

It is not clear why the police officers taking part in Correll et al.'s (2007a) study did not also mention these concerns. Perhaps the stimuli used in these studies are more compatible with use of force encounters in the U.S. (e.g., more split-second decisions are required) or perhaps the training American police officers receive is different in some way from that received by Canadian officers (e.g., with regard to what is a "reasonable" shoot decision). In any case, given that the concerns were raised it seems likely that these issues could have impacted the performance of the participants, particularly those with

policing experience. For example, if the argument presented previously is correct – that Canadian police officers possess useful “shooting schemas” that guide their lethal force decisions in naturalistic settings – then the unrealistic stimuli may not have activated their schemas, thus negatively impacting their performance (e.g., if some of the armed targets did not fit the officers’ schema of a “threatening target” they may have hesitated before shooting).

No matter the participant sample, it would be an improvement going forward to use more realistic shooting stimuli. Ideally, the stimuli should be three-dimensional and dynamic. The use of firearms simulators, which rely on video rather than static images would allow for this, although it will be challenging to use this technology for research purposes (e.g., in terms of expenses, getting sufficient time with the simulators, etc.). Using motion capture technology to develop animated targets is another interesting possibility that should be explored.²² More attention should also be paid to the actions of the targets presented to participants to ensure that shooting responses are in fact justified for all armed targets. Such actions could also be modeled using firearms simulators or motion capture technology, but the real work will be in collaborating with police officers and trainers to ensure that the appropriate actions are modeled. Beyond issues of realism, it would also be interesting in future research to manipulate other aspects of the stimuli. For example, target gender (attire, attractiveness, etc.) may impact lethal force decisions, as may a whole list of background factors (e.g., noise level, lighting conditions, etc.). In

²² Motion capture technology has begun in the Police Research Lab to develop dynamic, three-dimensional animated targets to examine how these factors impact shooting performance.

fact, the interactions between these factors should also be examined, as some researchers are already doing so (Plant, Kunstman, & Maner, 2010).²³

In addition to the realism of the stimuli, the police officers that were sampled raised a number of other concerns, primarily about the procedure used in the studies and the impact this had on “emotional realism”. The main issue discussed by police officers regarding the procedure was the unnatural feeling they got when asked to press a computer key to indicate a *shoot* or *don't shoot* decision. Obviously, officers are accustomed to something completely different when making shooting decisions (i.e., holding a gun and pulling/not pulling a trigger). Thus, the results obtained from the officers (and each of the other participant groups most likely) cannot be generalized to naturalistic settings. Another concern raised by the officers was that the scenarios lacked context, largely because no information was provided about the scenarios (e.g., through a dispatch). This was viewed as unrealistic by many officers and some suggested that this lack of information impacted their performance.

Compounding these issues is the fact that all of the studies were conducted under laboratory conditions. As a result, participants would not have experienced the same emotions that they would experience if encountering suspects in real world settings. Clearly, the simulated shooting task used in this series of studies did not elicit the same level of fear, stress, urgency, or general physiological arousal that would exist in naturalistic settings (Grossman, 1996), and this would have seriously impacted performance (Sharps, 2010). In addition, if police officers do actually exhibit superior decision making abilities under extreme stress for example (compared to students and/or

²³ Motion capture technology may also be an ideal way of addressing these issues. Once basic actions are captured and the initial work is done regarding target development, manipulating these factors (and looking at the effect of their interactions) is relatively straightforward and can be done quickly.

recruits) this would likely remain hidden with this type of study because of the lack of emotional realism.

Of course it is difficult to recreate the sorts of real world shooting conditions that are necessary in order to achieve appropriate levels ecological validity, but future research should strive to accomplish this as much as possible. Again, the use of firearms simulators or virtual reality systems may allow for a better balance between ecological validity and laboratory control than was accomplished in the current set of studies. Mock guns can be used with these technologies, which will go some way towards increasing the emotionally arousing elements and physical realism (e.g., Murphy & Ross, 2009). These technologies would also be ideal for providing some of context that the police officers were asking for. For example, dispatch communications (both accurate and inaccurate) could easily be built into the scenarios to examine the ways in which these messages influence expectations and subsequent use of force decision making (see Klinger & Bridges, 1997).

An Inability to Explain the White Bias

The focus of this dissertation was assessing the reliability of the White shooting bias that initially emerged in Study 1, rather than trying to explain why this bias emerged. However, now that this bias has been replicated across three separate studies, several questions arise: Why is there no Black shooting bias in Canada? And arguably of more interest, why is there a White shooting bias? Furthermore, what other sorts of racial biases may be found with Canadian participants? Unfortunately, the stereotype measures and demographic information collected in this dissertation did little to answer any of these questions and thus, they should be the focus of future research. Some of the major

limitations associated with this aspect of the dissertation will now be discussed so that future research can build upon this work.

As highlighted across the three studies, none of the explicit stereotype measures correlated in any meaningful way with shooting performance. As mentioned already, this is likely due to the fact that these measures are highly influenced by socially desirable responding (Correll et al., 2007a). Given this, future research should focus on the use of implicit racial stereotype measures, which are known to be more resistant to socially desirable responding (Dasgupta et al., 2000; Kim, 2003). The IAT used in this study is only one possibility among many, and other implicit measures may prove more informative than the IAT (see Correll, Judd, Park, & Wittenbrink, 2010, for a discussion of other implicit measures that can be used to examine racial stereotypes). As highlighted previously, research should carefully consider the sort of constructs that are assessed when using these measures (e.g., good-bad versus dangerous-safe).

In retrospect, given the White shooting bias that was found in this research, it may have been useful to also include explicit (and implicit) scales that tap into participants' views towards White individuals (beyond the adjective checklist whose limitations have already been mentioned). To the author's knowledge, no such scales exist and therefore researchers may need to construct new scales for this purpose, re-validate modifications to existing scales, or develop alternative methods to assess stereotypes (e.g., qualitative interviews with participants about their stereotypes). Beyond using these scales (or other methods) in future simulated shooting studies, it would also be useful to use these scales to examine the presence of White and Black stereotypes in larger samples of Canadian participants (both community members and police officers). The results from such studies

will help get to the root of the discrepancies between the current studies and those conducted by previous researchers by showing if cultural differences do in fact exist in terms of the stereotypes people possess.

Improvements can also be made to the demographic portion of this study in order to shed more light on the shooting bias that emerged. In the current studies, standard demographic variables were collected, such as age, gender, and minority status, none of which correlated with shooting performance. However, some of the variables were problematic. For example, the impact of minority status on shooting performance could not be properly assessed in the current study because of the relatively small number of visible minorities taking part in the current study (especially with the police officer and recruit samples). In order to properly examine the relationship between this variable and shooting biases, it would be necessary to collect a larger and more racially diverse sample. Other aspects of the demographic questionnaire proved particularly interesting, such as the participants' frequency and valence of interactions with Black and White individuals. These measures should continue to be collected and examined in future studies.

Upon reflection, it may have also been worthwhile to collect other sorts of demographic information in the current studies, such as participants' residential information. This would allow researchers (via census data) to examine the racial make-up of a participant's neighborhood. It may be that those living in urban centers, where the tendency is to have more ethnic diversity, are less biased in their shooting decisions because they interact more with "out-group" members (Schaller et al., 2010). Focusing future studies on issues around group identification may also be important. For example,

a recent study using the same shoot/don't shoot paradigm used here examined whether group identification would moderate racial bias (Kenworth, Barden, Diamond, & del Carmen, 2011). Findings showed that the decision to shoot Black targets became more likely as White in-group identification increased. This suggests that it may be less important with whom one interacts and more important with whom one identifies.

Arguably, one of the most noteworthy limitations of the current studies, at least when it comes to developing an understanding of how target race impacts simulated shooting decisions in Canada, is the fact that the targets were restricted to being Black or White. While the current studies were a starting point for this research in Canada (and therefore it made sense to see if previous Black biases would be replicated) a common theme that emerged when discussing these findings with colleagues was that other racial groups (e.g., Aboriginals, Asians, etc.) should be included in future studies. Simply because the participants in these studies did not show the common Black bias found in previous research, this does not mean that racial biases would not exist for these other minority groups (e.g., see Harmer, Stark, Taylor, & Bennell, 2011; Kahn & Davies, 2010; Lant et al., 2011; Unkelbach et al., 2008).

Within Canada, Aboriginal offenders are a target group that should definitely be included in future studies. Most Canadians recognize that there is a stigma associated with Aboriginals and stereotypes exist amongst Canadians towards Aboriginal people. Specifically, negative Aboriginal stereotypes have been documented, which include such traits as lazy, aggressive, uneducated, victims, etc. (Werhun & Penner, 2010). In addition, Kalin and Berry (1994) found that Native Canadians were ranked the most negatively in a hierarchy of attitudes toward eight Canadian ethnic groups and other research has found

biases against Aboriginals when looking at outcomes such as mock jury decisions (e.g., Lant et al., 2011; Maeder & Saliba, 2011; Pfeifer & Ogloff, 2003). Preliminary research has in fact indicated that Aboriginal shooting biases do in fact exist within Canada (e.g., Harmer et al., 2011), but this research has relied exclusively on student participants.

Finally, in order to further the understanding of the role of automatic and controlled processes in race-based shooting decisions, future researchers would be wise to complement the indirect assessment measures used in the current studies (i.e., assessing the role of these processes by estimating c and d') with more direct assessment methods. Eye tracking may be one way to determine more directly whether participants are focusing on the race of the target. This technology will also allow researchers to determine the extent to which participants are conducting controlled scans of scenes and the degree to which this ability corresponds with a range of important variables, such as police experience, scene complexity, and use of force training. This technique has been applied to tasks that are similar to the current shooting task (e.g., Sharps, 2010) and it will likely produce interesting results when applied to this task in the future.

Conclusion

There is a clear tendency for the Canadian participants sampled in this series of studies to demonstrate a shooting bias towards White, rather than Black, targets. This bias was found despite participants' police experience, it was heightened when scenes were made more complex, and it persisted in the face of implementation intention training. Future research should focus on replicating this bias using more valid stimuli/tasks and work towards discovering its origin. Moreover, it is essential for future research to widen the scope of racial targets used in such studies to determine the degree to which racial

biases exist for other groups (e.g., Aboriginals) that reside in Canada. Once shooting biases have been shown to exist within experimental settings, characterized by reasonable levels of ecological validity, and these biases are better understood in terms of the underlying processes that are driving them, attempts can be made to reduce these biases. Such reductions will increase the safety of police officers and the general community.

References

- Aleven, V., & Koedinger, K. (2002). An effective metacognitive strategy: Learning by doing and explaining with a computer-based Cognitive Tutor. *Cognitive Science*, 26, 147-179. doi: 10.1016/S0364-0213(02)00061-7
- Allport, G. W. (1954). *The nature of prejudice*. Anchor: Garden City, NY.
- Amodio, D. M., Harmon-Jones, E., Devine, P. G., Curtin, J. J., Hartley, S. L., & Covert, A. E. (2004). Neural signals for the detection of unintentional race bias. *Psychological Science*, 15, 88-93. doi: 10.1111/j.0963-7214.2004.01502003.x
- Augoustinos, M., & Ahrens, C. (1994). Stereotypes and prejudice: The Australian experience. *British Journal of Social Psychology*, 33(1), 125-141.
- Aveni, T. J. (2003, Aug). Officer-involved shootings: What we didn't know has hurt us. *Law and Order Magazine*, 1-18.
- Baddeley, A. (1986). *Working memory*. Oxford, UK: Clarendon.
- Bagby, M., Parker, J. D., Rector, N. A., & Kalembo, V. (1994). Racial prejudice in the Canadian legal system: Juror decisions in a simulated rape trial. *Law and Human Behavior*, 18(3), 339-350.
- Bargh, J. A. (1999). The cognitive monster: The case against controllability of automatic stereotype effects. In S. Chaiken & Y. Trope (Eds.), *Dual process theories in social psychology* (pp. 361-382). New York, NY: Guilford.
- Bauer, D. J., Pletcher, K. J., & Gil, K. M. (2006). Conceptualizing and testing random indirect effects and moderated mediation in multilevel models: New procedures and recommendations. *Psychological Methods*, 11, 142-163. doi: 10.1037/1082-989X.11.2.142

- Bennell, C., Jones, N. J., & Corey, S. (2007). Does use-of-force simulation training in Canadian police agencies incorporate principles of effective training? *Psychology, Public Policy, and Law*, 13, 35-58. doi: 10.1037/1076-8971.13.1.35
- Blair, I. V., & Banaji, M. R. (1996). Automatic and controlled processes in stereotype priming. *Journal of Personality and Social Psychology*, 70, 1126-1141. doi: 10.1037/0022-3514.70.6.1142
- Blair, I. V., Judd, C. M., Sadler, M. S., & Jenkins, C. (2002). The role of Afrocentric features as cues for judgment in the presence of diagnostic information. *European Journal of Social Psychology*, 35, 59-68. doi: 10.1037/0022-3514.83.1.5
- Blair, I. V., Ma, J. E., & Lenton, A. P. (2001). Imagining stereotypes away: The moderation of implicit stereotypes through mental imagery. *Journal of Personality and Social Psychology*, 81, 828-841. doi: 10.1037/0022-3514.81.5.828
- Bodenhausen, G. V. (1990). Stereotypes as judgmental heuristics: Evidence of circadian variations in discrimination. *Psychological Science*, 1, 319-322. doi: 10.1111/j.1467-9280.1990.tb00226.x
- Bosson, J. K., Swann, W. B. Jr., & Pennebaker, J. W. (2000). Stalking the perfect measure of implicit self-esteem: The blind men and the elephant revisited? *Journal of Personality and Social Psychology*, 79, 631-643. doi: 10.1037/0022-3514.79.4.631
- Brandstätter, V., Lengfelder, A., & Gollwitzer, P. M. (2001). Implementation intentions and efficient action initiation. *Journal of Personality and Social Psychology*, 81, 946-960. doi: 10.1037/0022-3514.81.5.946

- Brauer, M., Wasel, W., & Niedenthal, P. (2000). Implicit and explicit components of prejudice. *Review of General Psychology, 4*, 79-101. doi: 10.1037/1089-2680.4.1.79
- Brewer, M. B. (1999). The psychology of prejudice: Ingroup love and outgroup hate? *Journal of Social Issues, 55*, 429-444. doi: 10.1111/0022-4537.00126
- Brewer, M. B., & Caporael, L. (2006). An evolutionary perspective on social identity: Revisiting groups. In M. Schaller, J. A. Simpson, & D. T. Kenrick (Eds.), *Evolution and social psychology* (pp. 143-161). New York: Psychology Press.
- Budden, J. S., & Sagarin, B. J. (2007). Implementation intentions, occupational stress, and the exercise intention-behaviour relationship. *Journal of Occupational Health Psychology, 12*, 391-401. doi: 10.1037/1076-8998.12.4.391
- Bureau of Justice Statistics. (2007). *Racial differences exist, with blacks disproportionately represented among homicide victims and offenders*. Retrieved from <http://www.ojp.usdoj.gov/bjs/homicide/race.htm>
- Burgess, D. J. (2009). Are providers more likely to contribute to healthcare disparities under high levels of cognitive load? How features of healthcare setting may lead to biases in medical decision making. *Medical Decision Making, 30*, 246-257. doi: 10.1177/0272989X09341751
- Cacioppo, J. T., Marshall-Goodell, B. S., Tassinary, L. G., & Petty, R. E. (1992). Rudimentary determinants of attitudes: Classical conditioning is more effective when prior knowledge about the attitude stimulus is low than high. *Journal of Experimental Social Psychology, 28*, 207-233. doi: 10.1016/0022-1031(92)90053-M

- Carleton University. (2011). *Citizenship of full-time and part-time undergraduate, special, and graduate students by sex, 2010-11*. Retrieved from Carleton University, Office of Institutional Research and Planning website: http://oirp.carleton.ca/databook/2010/students/tables/table-SD5-1-aft_hpr.htm
- Chasteen, A. L., Park, D. C., & Schwarz, N. (2001). Implementation intentions and facilitation of prospective memory. *Psychological Science*, 12, 457-461. doi: 10.1111/1467-9280.00385
- Chen, S., Schechter, D., & Chaiken, S. (1996). Getting the truth or getting along: Accuracy vs. impression motivated heuristic and systematic processing. *Journal of Personality and Social Psychology*, 71(2), 262-274.
- Chi, M. T. H., Glaser, R., & Farr, M. (1988). *The nature of expertise*. Hillsdale, NJ: Erlbaum.
- Clark, R. C., Nguyen, F., & Sweller, J. (2005). *Efficiency in learning*. San Francisco: Jossey Bass Pfeiffer.
- Clow, K. A., & Esses, V. M. (2007). Expectancy effects in social stereotyping: Automatic and controlled processing in the Neely paradigm. *Canadian Journal of Behavioural Science*, 39, 161-173. doi: 10.1037/cjbs20070013
- Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, NJ: L. Erlbaum Associates.
- Cohn, E. S., Bucolo, D., Pride, M., & Sommers, S. R. (2009). Reducing White juror bias: The role of race salience and racial attitudes. *Journal of Applied Social Psychology*, 39, 1953-1973. doi: 10.1111/j.1559-1816.2009.00511.x

Cornford, I., & Athanasou, J. (1995). Developing expertise through training. *Industrial and Commercial Training*, 27(2), 10-18.

Correll, J. (2011). Order from Chaos? $1/f$ noise predicts performance on reaction time measures. *Journal of Experimental Psychology*, 47, 830-835. doi: 10.1016/j.jesp.2011.02019

Correll, J., Judd, C. M., Park, B., & Wittenbrink, B. (2010). Measuring prejudice, stereotypes, and discrimination. In J. F. Dovidio, M. Hewstone, P. Glick, & V. M. Esses (Eds.), *Prejudice, stereotyping, and discrimination* (pp. 115-130). Los Angeles, CA: Sage Publications Inc.

Correll, J., Park, B., Judd, C. M., & Wittenbrink, B. (2002). The police officer's dilemma: Using ethnicity to disambiguate potentially threatening individuals. *Journal of Personality and Social Psychology*, 83, 1314-1329. doi: 10.1037/0022-3514.83.6.1314

Correll, J., Park, B., Judd, C. M., Wittenbrink, B., Sadler, M. S., & Keesee, T. (2007a). Across the thin blue line: Police officers and racial bias in the decision to shoot. *Journal of Personality and Social Psychology*, 92, 1006-1023. doi: 10.1037/0022-3514.92.6.1006

Correll, J., Park, B., Judd, C. M., & Wittenbrink, B. (2007b). The influence of stereotypes on decisions to shoot. *European Journal of Social Psychology*, 37, 1102-1117. doi: 10.1002/ejsp.450

Correll, J., Wittenbrink, B., Park, B., Judd, C. M., & Goyle, A. (2011). Dangerous enough: Moderating racial bias with contextual threat cues. *Journal of Experimental Social Psychology*, 47, 184-189. doi: 10.1016/j.jesp.2010.08.017

- Dasgupta, N., & Greenwald, A. G. (2001). On the malleability of automatic attitudes: Combating automatic prejudice with images of admired and disliked individuals. *Journal of Personality and Social Psychology*, 81, 800-814. doi: 10.1037/0022-3514.81.5.800
- Dasgupta, N., McGhee, D. E., Greenwald, A. G., & Banaji, M. R. (2000). Automatic preference for White Americans: Eliminating the familiarity explanation. *Journal of Experimental Social Psychology*, 36, 316-328. doi: 10.1006/jesp.1999.1418
- DeLeeuw, K. E., & Mayer, R. E. (2008). A comparison of three measures of cognitive load: Evidence for separable measures of intrinsic, extraneous, and germane load. *Journal of Educational Psychology*, 100, 223-234. doi: 10.1037/0022-0663.100.1.223
- Der, G., & Deary, I. J. (2006). Age and sex differences in reaction time in adulthood: Results from the United Kingdom health and lifestyle survey. *Psychology and Aging*, 21, 62-73. doi: 10.1037/0882-7974.21.1.62
- Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology*, 56, 5-18. doi: 10.1037/0022-3514.56.1.5
- Devine, P. G. & Elliot, A. J. (1995). Are racial stereotypes *really* fading? The Princeton trilogy revisited. *Personality and Social Psychology Bulletin*, 21(11), 1139-1150.
- Devine, P. G., Plant, E. A., Amodio, D. M., Harmon-Jones, E., & Vance, S. L. (2002). The regulation of explicit and implicit race bias: The role of motivations to respond without prejudice. *Journal of Personality and Social Psychology*, 82, 835-848. doi: 10.1037/0022-3514.82.5.835

- Dixon, T. L. (2008). Who is the victim here? The psychological effects of over-representing White victims and Black perpetrators on television news. *Journal of Journalism*, 9, 582-605. doi: 10.1177/1464884908094160
- Dovidio, J. F., Hewstone, M., Glick, P., & Esses, V. M. (2010). *Prejudice, stereotyping, and discrimination*. Los Angeles, CA: SAGE Publications Inc.
- Dovidio, J. F., Kawakami, K., Johnson, C., Johnson, B., & Howard, A. (1997). On the nature of prejudice: Automatic and controlled processes. *Journal of Experimental Social Psychology*, 33, 510-540.
- Dovidio, J. F., Kawakami, K., Smoak, N., & Gaertner, S. L. (2009). The nature of contemporary racial prejudice. In R. E. Petty, R. H. Fazio, & P. Briñol (Eds.), *Attitudes* (pp. 165-192). New York, NY: Psychology Press.
- Duncan, B. L. (1976). Differential social perception and attribution of intergroup violence: Testing the lower limits of stereotyping of Blacks. *Journal of Personality and Social Psychology*, 34, 590-598. doi: 10.1037/0022-3514.34.4.590
- Dunton, B. C., & Fazio, R. H. (1997). An individual difference measure of motivation to control prejudiced reactions. *Personality and Social Psychology Bulletin*, 23, 316-326. doi: 10.1177.0146167297233009
- Eberhardt, J. L., Goff, P. A., Purdie, V. J., & Davies, P. G. (2004). Seeing Black: Race, crime, and visual processing. *Journal of Personality and Social Psychology*, 87, 876-893. doi: 10.1037/0022-3514.87.6.876

- Einstein, G. O., McDaniel, M. A., Williford, C. L., Pagan, J. L., & Dismukes, R. K. (2003). Forgetting of intentions in demanding situations is rapid. *Journal of Experimental Psychology: Applied*, 9, 147-162. doi: 10.1037/1076-898X.9.3.147
- Entman, R. (1992). Blacks in the news: Television, modern racism, and cultural change. *Journalism Quarterly*, 69, 341-361.
- Evans, M. G. (1991). On the use of moderated regression. *Canadian Psychology*, 32, 116-119. doi: 10.1037/h0078968
- Fazio, R. H. (1990). Multiple processes by which attitudes guide behaviour: the MODE model as an integrative framework. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (pp. 75-109). San Diego, CA: Academic Press.
- Fazio, R. H., Jackson, J. R., Dunton, B. C., & Williams, C. J. (1995). Variability in automatic activation as unobtrusive measure of racial attitudes: A bona fide pipeline? *Journal of Personality and Social Psychology*, 69, 1013-1027. doi: 10.1037/0022-3514.69.6.1013
- Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology*, 54, 297-327. doi: 10.1146/annurev.psych.54.101601.145225
- Ferreira, M. B., Garcia-Marques, L., Sherman, S. J., & Sherman, J. W. (2006). Automatic and controlled components of judgment and decision making. *Journal of Personality and Social Psychology*, 91, 797-813. doi: 10.1037/0022-3514.91.5.797
- Field, A. P. (2005). *Discovering statistics using SPSS*. London, UK: Sage Publications Inc.

- Fiske, S. T. (1998). Stereotyping, prejudice, and discrimination. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *Handbook of Social Psychology* (4th ed., pp. 357-411). Boston, MA: McGraw-Hill.
- Fiske, S. T., & Russell, A. M. (2010). Cognitive processes. In J. F. Dovidio, M. Hewstone, P. Glick, & V. M. Esses (Eds.), *Prejudice, stereotyping, and discrimination* (pp. 115-130). Los Angeles, CA: Sage Publications Inc.
- Fitzgerald, K., Crewe, K., & Schuller, R. (2011). *Race-based pretrial questioning: Can explicitly rendering racial issues salient impact jurors' decisions in trials of Black defendants?* Poster presented at the 4th International Congress on Psychology and Law, Miami, FL.
- Forster, S., & Lavie, N. (2008). Failure to ignore entirely irrelevant distracters: The role of load. *Journal of Experimental Psychology Applied*, 14, 73-83. doi: 10.1037/1076-898X.14.1.73
- Gaertner, S. L., & Dovidio, J. F. (1986). The aversive form of racism. In J. F. Dovidio & S.L. Gaertner (Eds.), *Prejudice, discrimination, and racism* (pp. 61-89). Orlando, FL: Academic Press.
- Gawronski, B., Deutsch, R., Mbrikou, S., Seibt, B., & Strack, F. (2008). When “just say no” is not enough: Affirmation versus negation training and the reduction of automatic stereotype activation. *Journal of Experimental Social Psychology*, 44, 370-377. doi: 10.1016/j.jesp.2006.12.004
- Gawronski, B., Geschke, D., & Banse, R. (2003). Implicit bias in impression formation: Associations influence the construal of individuating information. *European Journal of Social Psychology*, 33, 573-589. doi: 10.1002/ejsp.166

- Gilbert, D. T., & Hixon, J. G. (1991). The trouble of thinking: Activation and application of stereotypic beliefs. *Journal Personality of Social Psychology*, 60, 509-517. doi: 10.1037/0022-3514.60.4.509
- Gilliam, F. D. Jr., Iyengar, S., Simon, A., & Wright, O. (1996). Crime in Black and White: The violent, scary world of local news. *Harvard International Journal of Press/Politics*, 1, 6-23. doi: 10.1177/1081180X96001003003
- Glaser, J., & Knowles, E. D. (2008). Implicit motivation to control prejudice. *Journal of Experimental Social Psychology*, 44, 164-172. doi: 10.1016/j.jesp.2007.01.002
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, 54, 493-503. doi: 10.1037/0003-066X.54.7.493
- Gollwitzer, P. M., & Brandstätter, V. (1997). Implementation intentions and effective goal pursuit. *Journal of Personality and Social Psychology*, 73, 186-199. doi: 10.1037/0022-3514.73.1.186
- Gollwitzer, P. M., Fujita, K., & Oettingen, G. (2004). Planning and the implementation of goals. In R. F. Baumeister & K. D. Vohs, (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 211-228). New York: Guilford.
- Gollwitzer, P. M., & Schaal, B. (1998). Metacognition in action: The important of implementation intentions. *Personality and Social Psychology Review*, 2, 124-136. doi: 10.1207/s15327957pspr0202_5
- Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology*, 38, 69-119. doi: 10.1016/S0065-2601(06)38002-1

- Govorun, O., & Payne, K. B. (2006). Ego-depletion and prejudice: Separating automatic and controlled components. *Social Cognition, 24*, 111-136. doi: 10.1521/soco.2006.24.2.111
- Green, D. M., & Swets, J. A. (1966). *Signal detection theory and psychophysics*. New York: Wiley.
- Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology, 74*, 1464-1480. doi: 10.1037/0022-3514.74.6.1464
- Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the implicit association test: 1. An improved scoring algorithm. *Journal of Personality and Social Psychology, 85*, 197-216. doi: 10.1037/0022-3514.85.2.197
- Grossman, D. (1996). *On killing*. Boston, MA: Little, Brown, & Co.
- Hacker, A. (1995). *Two nations: Black and White, separate, hostile, and unequal* (2nd Ed.). New York, NY: Ballantine Books.
- Harmer, S., Stark, L., Taylor, A., & Bennell, C. (2011). *The role of Aboriginal stereotypes in simulated shooting decisions*. Poster presented at the annual North American Correctional and Criminal Justice Psychology Conference, Toronto, ON.
- Henry, P. J., & Sears, D. O. (2002). The symbolic racism 2000 scale. *Political Psychology, 23*, 253-283. doi: 10.1111/0162-895X.00281

- Hewstone, M., Rubin, M., & Willis, H. (2002). Intergroup bias. *Annual Review of Psychology*, 53, 575-604. doi: 10.1146/annurev.psych.53.100901.135109
- Hilton, J. L., & von Hippel, W. (1996). Stereotypes. *Annual Review of Psychology*, 47, 237-271. doi: 10.1146/annurev.psych.47.1.237
- Hofmann, W., Gawronski, B., Gschwendner, T., Le, H., & Schmitt, M. (2005). A meta-analysis on the correlation between the implicit association test and explicit self-report measures. *Personality and Social Psychology Bulletin*, 31, 1369-1385. doi: 10.1177/0146167205275613
- Holt, L.F. (2010). *Writing the wrong: Can counter-stereotypes offset negative media messages about African-Americans?* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3409760).
- Horrey, W. J., & Simons, D. J. (2007). Examining cognitive interference and adaptive safety behaviours in tactical vehicle control. *Ergonomics*, 50, 1340-1350. doi: 10.1080/00140130701318889
- Huisman, K., Martinez, J., & Wilson, C. (2005). Training police officers on domestic violence and racism. *Violence Against Women*, 11, 792-821. doi: 10.1177/1077801205276110
- Hurwitz, J., & Peffley, M. (1997). Public perceptions of race and crime: The role of racial stereotypes. *American Journal of Political Science*, 41(2), 375-401.
- Implicit Association Test Corporation (IAT Corp). (2010). *Race attitude* [data file]. Retrieved from <https://implicit.harvard.edu/implicit/demo/background/raceinfo.html>

- Jamieson, K. H. (1992). *Dirty politics: Deception, distraction, and democracy*. New York, NY: Oxford University Press.
- Jamieson, D. W., & Zanna, M. P. (1989). Need for structure in attitude formation and expression. In A. R. Pratkanis, S. J. Breckler, & A. G. Greenwald (Eds.), *Attitude structure and function* (pp. 383-406). Hillsdale, NJ: Erlbaum.
- Johnson, J. D., Adams, M. S., Hall, W., & Ashburn, L. (1997). Race, media, and violence: Differential racial effects of exposure to violent news stories. *Basic and Applied Social Psychology*, 19, 81-90. doi: 10.1207/s15324834baspp1901_6
- Johnson, J. D., Trawalter, S., & Dovidio, J. F. (2000). Converging interracial consequences of exposure to violent rap music on stereotypical attributions of Blacks. *Journal of Experimental Social Psychology*, 36, 233-251. doi: 10.1006/jesp.1999.1404
- Johnson, J. D., Whitestone, E., Jackson, L. A., & Gatto, L. (1995). Justice is still not colorblind: Differential racial effects of exposure to inadmissible evidence. *Personality and Social Psychology Bulletin*, 21, 893-898. doi: 10.1177/0146167295219003
- Jones, C. R., & Fazio, R. H. (2010). Person categorization and automatic racial stereotyping effects on weapon identification. *Personality and Social Psychology Bulletin*, 36, 1073-1085. doi: 10.1177/014616721037817
- Kahn, K. B., & Davies, P. G. (2010). Differentially dangerous? Phenotypic racial stereotypicality increases implicit bias among ingroup and outgroup members. *Group Processes Intergroup Relations*. Advanced online publication. doi: 10.1177/1368430210374609

- Kalin, R., & Berry, J. W. (1994). Ethnic and multicultural attitudes. In J. W. Berry & J. Laponce (Eds.), *Ethnicity and culture in Canada: The research landscape*. (pp. 293-321). Toronto, ON: University of Toronto Press.
- Kalyuga, S., Ayres, P., Chandler, P., & Sweller, J. (2003). The expertise reversal effect. *Educational Psychologist, 38*, 23-31. doi: 10.1207/S15326985EP3801_4
- Kalyuga, S., Chandler, P., & Sweller, J. (1999). Managing split-attention and redundancy in multimedia instruction. *Applied Cognitive Psychology, 13*, 351-317. doi: 10.1002/(SICI)1099-0720(199908)
- Karpinski, A., & Hilton, J. L. (2001). Attitudes and the implicit association test. *Journal of Personality and Social Psychology, 81*, 774-788. doi: 10.1037/0022-3514.81.5.774
- Katz, D., & Braly, K. (1933). Racial stereotypes in one hundred college students. *Journal of Abnormal and Social Psychology, 28*, 280-290. doi: 10.1037/h0074049
- Kawakami, K., Dovidio, J. F., Moll, J., Hermsen, S., & Russin, A. (2000). Just say no (to stereotyping): Effects of training in the negation of stereotypic associations on stereotype activation. *Journal of Personality and Social Psychology, 78*, 871-888. doi: 10.1037/0022-2514.78.5.871
- Kenworth, J. B., Barden, M. A., Diamond, S., & del Carmen, A. (2011). Ingroup identification as a moderator of racial bias in a shoot-no shoot decision task. *Group Processes Intergroup Relations, 14*, 311-318. doi: 10.1177/1368430210392932
- Killen, M., Richardson, C. B., & Kelly, M. C. (2010). Developmental perspectives. In J.F. Dovidio, M. Hewstone, P. Glick, & V. M. Esses (Eds.), *Prejudice*,

stereotyping, and discrimination (pp. 97-114). Los Angeles, CA: SAGE Publications Inc.

Kim, D-Y. (2003). Voluntary controllability of the implicit association tests (IAT). *Social Psychology Quarterly*, 66(1), 83-96.

Kirschner, P. A. (2002). Cognitive load theory: Implications of cognitive load theory on the design of learning. *Learning and Instruction*, 12, 1-10. doi: 10.1016/S0959-4752(01)00014-7

Klinger, D. A., & Bridges, G. S. (1997). Measurement error in calls-for-service as an indicator of crime. *Criminology*, 35, 705-726. doi: 10.1111/j.1745-9125.1997.tb01236.x

Krueger, J. (1996). Personal beliefs and cultural stereotypes about racial characteristics. *Journal of Personality and Social Psychology*, 71, 536-548. doi: 10.1037/0022-3514.71.3.536

Kunda, Z., & Spencer, S. J. (2003). When do stereotypes come to mind and when do they color judgment? A goal-based theoretical framework for stereotype activation and application. *Psychological Bulletin*, 129, 522-544. doi: 10.1037/0033-2909.129.4.522

Lant, J. M., Clow, K. A., & Cutler, B. (2011). *Perceptions of defendant culpability in pretrial publicity: The effects of defendant ethnicity and cognitive load*. Paper presented at the 4th International Congress on Psychology and Law, Miami, FL.

LaPrairie, C. (2002). Aboriginal over-representation in the criminal justice system: A tale of nine cities. *Canadian Journal of Criminology*, April, 181-208.

- Lepore, L., & Brown, R. (1997). Category and stereotype activation: Is prejudice inevitable? *Journal of Personality and Social Psychology*, 72, 275-287. doi: 10.1037/0022-3514.72.2.275.
- Lersch, K. M., Bazley, T., Mieczkowski, T., & Childs, K. (2008). Police use of force and neighbourhood characteristics: An examination of structural disadvantage, crime, and resistance. *Policing & Society*, 18, 282-300. doi: 10.1080/10439460802091690
- Lippman, W. (1922). *Public opinion*. New York: Harcourt, Brace.
- Macrae, C. N., & Bodenhausen, G. V. (2000). Social cognition: Thinking categorically about others. *Annual Review of Psychology*, 51, 93-120. doi: 10.1146/annurev.psych.51.1.93
- Macrae, C. N., Bodenhausen, G. V., Milne, A. B., & Calvini, G. (1999). Seeing more than we can know: Visual attention and category activation. *Journal of Experimental Social Psychology*, 35, 590-602. doi: 10.1006/jesp.1999.1396
- Macrae, C. N., Bodenhausen, G. V., Milne, A. B., Thorn, T. M. J., & Castelli, L. (1997). On the activation of social stereotypes: The moderating role of processing objectives. *Journal of Experimental Social Psychology*, 33, 471-489. doi: 10.1006/jesp.1997.1328
- Macrae, C. N., Stangor, C., & Milne, A. B. (1994). Activating social stereotypes: A functional analysis. *Journal of Experimental Social Psychology*, 30, 370-389. doi: 10.1006/jesp.1994.1018

- Maeder, E., & Saliba, P. (2011). *The influence of juror gender, defendant race, and victim attractiveness on juror decision making in a sexual assault trial*. Poster presented at the 4th International Congress on Psychology and Law, Miami, FL.
- Manzo, J. F., & Bailey, M. M. (2005). On the assimilation of racial stereotypes among Black Canadian young offenders. *Canadian Review of Sociology*, 42, 283-300. doi: 10.1111/j.1755-618X.2005tb.00841.x
- Marcus-Newhall, A., Blake, L. P., & Baumann, J. (2002). Perceptions of hate crime perpetrators and victims as influenced by race, political orientation, and peer group. *American Behavioral Scientist*, 46, 108-135. doi: 10.1177/0002764202046001008
- Marion, N. (1998). Police academy training: Are we teaching recruits what they need to know? *Policing: An International Journal of Police Strategies & Management*, 21, 54-79. doi: 10.1108/13639519810206600
- McConahay, J. B. (1986). Modern racism, ambivalence, and the modern racism scale. In J. F. Dovidio & S. L. Gaertner (Eds.), *Prejudice, discrimination, and racism* (pp. 91-126). New York, NY: Academic Press.
- McConnell, A. R., & Leibold, J. M. (2001). Relations among the implicit association test, discriminatory behavior, and explicit measures of racial attitudes. *Journal of Experimental Social Psychology*, 37, 435-442. doi: 10.1006/jesp.2000.1470
- McDaniel, M. A., & Scullin, M. K. (2010). Implementation intention encoding does not automatize prospective memory responding. *Memory & Cognition*, 38, 221-232. doi: 10.3758/MC.38.2.221

- McGlothlin, H., & Killen, M. (2006). Intergroup attitudes of European American children attending ethnically homogeneous schools. *Child Development, 77*, 1375-1386. doi: 10.1111/j.1467-8624.2006.00941.x
- Mendoza, S. A., Gollwitzer, P. M., & Amodio, D. M. (2010). Reducing the expression of implicit stereotypes: Reflexive control through implementation intentions. *Personality and Social Psychology Bulletin, 36*, 512-523. doi: 10.1177/0146167210362789
- Metcalfe, J., & Jacobs, W. J. (1996). A "hot-system/cool-system" view of memory under stress. *PTSD Research Quarterly, 7*(2), 1-6.
- Miller, S. L., Maner, J. K., & Becker, V. D. (2010). Self-protective biases in group categorization: Threat cues shape the psychological boundary between "us" and "them". *Journal of Personality and Social Psychology, 99*, 62-77. doi: 10.1037/a0018086
- Mitchell, L., & Flin, R. (2007). Shooting decisions by police firearms officers. *Journal of Cognitive Engineering and Decision Making, 4*, 375-390. doi: 10.1518/155534307X264861
- Mitchell, T. L., Haw, R. M., Pfeifer, J. E., & Meissner, C. A. (2005). Racial bias in mock juror decision-making: A meta-analytic review of defendant treatment. *Law and Human Behavior, 29*, 621-637. doi: 10.1007/s10979-005-8122-9
- Moreno, K. N., & Bodenhausen, G. V. (1999). Resisting stereotype change: The role of motivation and attentional capacity in defending social beliefs. *Group Processes and Intergroup Relations, 2*, 5-16. doi: 10.1177/1368430299021001

Morrison, G. B. (2006). Deadly force programs among larger U.S. police departments.

Police Quarterly, 9, 331- 360. doi: 10.1177/1098611105276542

Moskowitz, G. B., Salomon, A. R., & Taylor, C. M. (2000). Preconsciously controlling stereotyping: Implicitly activated egalitarian goals prevent the activation of stereotypes. *Social Cognition*, 18, 151-177. doi: 10.1521/soco.2000.18.2.151

Murphy, R. L., & Ross, D. L. (2009). *Virtual training systems and survival humanistic factors*. Paper presented at the Interservice/Industry Training, Simulation &

Education Conference, Orlando, FL. Abstract retrieved from

<http://ntsa.metapress.com/app/home/contribution.asp?referrer=parent&backto=issue,170,171;journal,2,18;linkingpublicationresults,1:113340,1>

Nesdole, R. S. A. (2009). *An investigation into the criterion related validity of the*

Prejudiced Attitudes Towards Aboriginals Scale. (Master's thesis). Retrieved

from http://library2.usask.ca/theses/available/etd-08302009-213554/unrestricted/Robert_Nesdole_Thesis.pdf

Nosek, B. A., Greenwald, A. G., & Banaji, M. R. (2007). The implicit association test at age 7: A methodological and conceptual review. In J. A. Bargh (Ed.), *Automatic processes in social thinking and behavior* (pp. 265-292). New York: Psychology Press.

Nosek, B. A., & Smyth, F. L. (2007). A multitrait-multimethod validation of the Implicit Association Test: Implicit and explicit attitudes are related but distinct constructs.

Experimental Psychology, 54, 14-29. doi: 10.1027/1618-3169.54.1.14

Olson, M. A., & Fazio, R. H. (2004). Reducing the influence of extrapersonal

associations on the Implicit Association Test: Personalizing the IAT. *Journal of*

Personality and Social Psychology, 86, 653-667. doi: 10.1037/0022-3514.86.5.653

Olson, M. A., & Fazio, R. H. (2009). Implicit and explicit measures of attitudes: The perspective of the MODE model. In R. E. Petty, R. H. Fazio, & P. Briñol (Eds.), *Attitudes* (pp. 19-63). New York, NY: Psychology Press.

Ontario Police College. (2011). *Course calendar*. Retrieved the Ontario Police College website: <http://www.opconline.ca/calendar/Calendar.pdf>

Ottawa Citizen (2007, April 7). Renfrew man shot dead by police. *The Ottawa Citizen*. Retrieved from <http://www.canada.com/ottawacitizen/news/story.html?id=37f5c473-ab5e-4b7a-b07d-8806139c95bb&k=64153>

Paas, F. (1992). Training strategies for attaining transfer of problem-solving skill in statistics: A cognitive-load approach. *Journal of Educational Psychology*, 84, 429-434. doi: 10.1037/0022-0663.84.4.429

Paas, F., Renkl, A., & Sweller, J. (2003). Cognitive load theory and instructional design: Recent developments. *Educational Psychologist*, 38, 1-4. doi: 10.1207/S15326985EP3801_1

Paas, F., Renkl, A., & Sweller, J. (2004). Cognitive load theory: Instructional implications of the interaction between information structures and cognitive architecture. *Instructional Science*, 32, 1-8. doi: 10.1023/B:TRUC.00000021806.17516.d0

Paas, F., Tuovinen, J. E., Tabbers, H., & Van Gerven, P. W. M. (2003). Cognitive load measurement as a means to advance cognitive theory. *Educational Psychologist*, 38, 63-71. doi: 10.1023/B:TRUC.00000021806.17516.d0

- Pacini, R., & Epstein, S. (1999). The relation of rational and experiential information processing style to personality, basic beliefs, and the ratio-bias phenomenon. *Journal of Personality and Social Psychology*, 76, 972-987. doi: 10.1037/0022-3514.76.6.972
- Panksepp, J. (1998). *Affective neuroscience: The foundations of human and animal emotions*. New York: Oxford University Press.
- Payne, K. B. (2001). Prejudice and perception: The role of automatic and controlled processes in misperceiving a weapon. *Journal of Personality and Social Psychology*, 81, 181-192. doi: 10.1037/0022-3514.81.2.181
- Payne, B. K., Lambert, A. J., & Jacoby, L. L. (2002). Best laid plans: Effects of goals on accessibility bias and cognitive control in race-based misperceptions of weapons. *Journal of Experimental Social Psychology*, 38, 384-396. doi: 10.1016/S0022-1031(02)00006-9
- Petrocelli, M., Piquero, A. R., & Smith, M. R. (2003). Conflict theory and racial profiling: An empirical analysis of police traffic stops data. *Journal of Criminal Justice*, 31, 1-11. doi: 10.1016/S0047-2352(02)00195-2
- Petty, R. E., & Cacioppo, J. T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. New York: Springer-Verlag.
- Pfeifer, J. E., & Ogloff, J. R. P. (2003). Mock juror ratings of guilt in Canada: Modern racism and ethnic heritage. *Social Behavior and Personality: An International Journal*, 31, 301-312. doi: 10.2224/sbp.2003.31.3.301

- Plant, E. A., Goplen, J., & Kunstman, J. W. (2011). Selective responses to threat: The roles of race and gender in decisions to shoot. *Personality and Social Psychology Bulletin*. Advance online publication. doi: 10.1177/0146167211408617
- Plant, E. A., Kunstman, J. W., & Maner, J. K. (2010). You do not only hurt the one you love: Self-protective responses to attractive relationship alternatives. *Journal of Experimental Social Psychology*, 46, 474-477. doi: 10.1016/j.jesp.2009.12.012
- Plant, E. A., & Peruche, B. M. (2005). The consequences of race for police officers' responses to criminal suspects. *Psychological Science*, 16, 180-183. doi: 10.1111/j.0956-7976.2005.00800.x
- Plant, E. A., Peruche, B. M., & Butz, D. A. (2005). Eliminating automatic racial bias: Making race non-diagnostic for responses to criminal suspects. *Journal of Experimental Social Psychology*, 41, 141-156. doi: 10.1016/j.jesp.2004.07.004
- Project Implicit. (2008a). *Stimulus material*. Retrieved from <http://www.projectimplicit.net/stimuli.php>
- Project Implicit. (2008b). *Implicit Association Test: Validity debates*. Retrieved from http://faculty.washington.edu/agg/iat_validity.htm#exemplars
- Psychology Software Tools. (2009). *E-Prime 2.0 release candidate*. Pittsburgh, PA.
- Rolls, E. T. (1999). *The brain and emotion*. New York, NY: Oxford University Press.
- Rudman, L. A., Ashmore, R. D., & Gary, M. L. (2001). "Unlearning" automatic biases: The malleability of implicit prejudice and stereotypes. *Journal of Personality and Social Psychology*, 81, 856-868. doi: 10.1037/0022-3514.81.5.856

- Rudman, L. A., & Lee, M. R. (2002). Implicit and explicit consequences of exposure to violent and misogynous rap music. *Group Processes & Intergroup Relations*, 5, 133-150. doi: 10.1177/1368430202005002541
- Sagar, H. A., & Schofield, J. W. (1980). Racial and behavioral cues in Black and White children's perceptions of ambiguously aggressive acts. *Journal of Personality and Social Psychology*, 39, 590-598. doi: 10.1037/0022-3514.39.4.590
- Schaller, M., Conway, L. G., & Peavy, K. M. (2010). Evolutionary processes. In J.F. Dovidio, M. Hewstone, P. Glick, & V. M. Esses (Eds.), *Prejudice, stereotyping, and discrimination* (pp. 81-96). Los Angeles, CA: SAGE Publications Inc.
- Schaller, M., Park, J. H., & Mueller, A. (2003). Fear of the dark: Interactive effects of beliefs about danger and ambient darkness on ethnic stereotypes. *Personality and Social Psychology Bulletin*, 29, 637-649. doi: 10.1177/0146167203029005008
- Schuller, R. A., Kazoleas, V., & Kawakami, K. (2009). The impact of prejudice screening procedures on racial bias in the courtroom. *Law and Human Behaviour*, 33, 320-328. doi: 10.1007/s10979-008-9153-9
- Seattle Times. (2007, February 14). Man shot by police was holding drill. *The Seattle Times*. Retrieved from http://seattletimes.nwsources.com/html/localnews/2003571045_dige14m.html
- Sharps, M. J. (2010). *Processing under pressure: Stress, memory, and decision-making in law enforcement*. Flushing, NY: Looseleaf Law.
- Sharps, M. J., & Hess, A. B. (2008). To shoot or not to shoot: Response and interpretation of response to armed assailants. *The Forensic Examiner*, 17, 53-64.

- Sherman, J. W., Conrey, F. R., & Groom, C. J. (2004). Encoding flexibility revisited: Evidence for enhanced encoding of stereotype-inconsistent information under cognitive load. *Social Cognition*, 22, 214-232. doi: 10.1521/soco.22.2.214.35464
- Sherman, J. W., Gawronski, B., Gonsalkorale, K., Hugenberg, K., Allen, T. J., & Groom, C. J. (2008). The self-regulation of automatic associations and behavioural impulses. *Psychological Review*, 115, 314-335. doi: 10.1037/0033-295X.115.2.314
- Shiffrin, R. M., & Schneider, W. (1977). Controlled and automatic human information processing: II. Perceptual learning, automatic attending and a general theory. *Psychological Review*, 84, 127-190. doi: 10.1037/0033-295X.84.2.127
- Sinclair, L., & Kunda, Z. (1999). Reactions to a Black professional: Motivated inhibition and activation of conflicting stereotypes. *Journal of Personality and Social Psychology*, 77, 855-904. doi: 10.1037/0022-3514.77.5.885
- Smith, M. R., & Alpert, G. P. (2007). Explaining police bias: A theory of social conditioning and illusory correlation. *Criminal Justice and Behavior*, 34, 1262-1283. doi: 10.1177/0093854807304484
- Sommers, S. R., & Ellsworth, P. C. (2000). Race in the courtroom: Perceptions of guilt and dispositional attributions. *Personality and Social Psychology Bulletin*, 26, 1367-1379.
- Sommers, S. R., & Ellsworth, P. C. (2001). White juror bias: An investigation of prejudice against Black defendants in the American courtroom. *Psychology, Public Policy, and Law*, 7, 201-229. doi: 10.1037/1076-8971.7.1.201

- Stewart, B. D., & Payne, B. K. (2008). Bringing automatic stereotyping under control: Implementation intention as efficient means of thought control. *Personality and Social Psychology Bulletin*, 34, 1332-1345. doi: 10.1177/0146167208321269
- Stinchcombe, A., & Gagnon, S. (2009, June). *Estimating workload demands of turning left at intersections of varying complexity*. Symposium conducted at the meeting of the 5th International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design, Big Sky, MT.
- Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review*, 8, 220-247. doi: 10.1207/s15327957pspr0803_1
- Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, 18, 643-662. doi: 10.1037/0096-3445.121.1.15
- Sweeney, L. T., & Haney, C. (1992). The influence of race on sentencing: A meta-analytic review of experimental studies. *Behavioural Science and the Law*, 10, 179-195 doi: 10.1002/bsl.2370100204
- Swets, J. A. (1973). The relative operating characteristic in psychology. *Science*, 182, 990-1000. doi: 10.1126/science.182.4116.990
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th Ed.). Boston, MA: Pearson.
- Terrill, W., & Mastrofski, S. D. (2002). Situational and officer based determinants of police coercion. *Justice Quarterly*, 19, 215-248. doi: 10.1080/07418820200095221

- Unkelbach, C., Forgas, J. P., & Denson, T. F. (2008). The turban effect: The influence of Muslim headgear and induced affect on aggressive responses in the shooter bias paradigm. *Journal of Experimental Social Psychology, 44*, 1409-1413. doi: 10.1016/j.jesp.2008.04.003
- Unkelbach, C., Schneider, H., Gode, K., & Senft, M. (2010). A turban effect, too: Selection biases against women wearing Muslim headscarves. *Social Psychological and Personality Science, 1*, 378-383. doi: 10.1177/1948550610378381
- Unnever, J. D., & Cullen, F. T. (2007). The racial divide in support for the death penalty: Does White racism matter? *Social Forces, 85*, 1281-1301. doi: 10.1353/sof.2007.0058
- van Gog, T., Ericsson, K. A., Rikers, R. M. J. P., & Paas, F. (2005). Instructional design for advanced learners: Establishing connections between the theoretical frameworks and cognitive load and deliberate practice. *Educational Technology Research and Development, 53*, 73-81. doi: 10.1007/BF02504799
- Vander Veen, S. (2000). *Mock jurors' attitudes towards aboriginal defendants: A symbolic racism approach* (Master's thesis). Retrieved from <http://ir.lib.sfu.ca/retrieve/2858/etd2166.pdf>
- Watt, J. J. (2010). *Strategies for influencing implicit associations in shooting decisions: A test of longevity* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3413192).

- Webb, J. S., & Sheeran, B. J. (2007). Implementation intentions, occupational stress, and the exercise intention-behavior relationship. *Journal of Occupational Health Psychology, 12*, 391-401. doi: 10.1037/1076-8998.12.4.391
- Webb, T. L., Sheeran, P., & Pepper, J. (2011). Gaining control over responses to implicit attitude tests: Implementation intentions engender fast responses on attitude-incongruent trials. *British Journal of Social Psychology*. Advance online publication. doi: 10.1348/014466610X532192.
- Weiss, M. (1999, March 30). Diallo cops to give their side of story – A tale of 8 seconds that shoot the city. *The New York Post*, p. 4.
- Weitzer, R., & Tuch, S. A. (2005). Racially biased policing: Determinants of citizen perceptions. *Social Forces, 83*, 1009-1030. doi: 10.1352/sof.2005.0050
- Werhun, C. D., & Penner, A. J. (2010). The effects of stereotyping and implicit theory on benevolent prejudice towards Aboriginal Canadians. *Journal of Applied Social Psychology, 40*, 899-916. doi: 10.1111/j.1559-1816.2010.00603.x
- Wigboldus, D. H. J., Sherman, J. W., Franzese, H. L., & van Knippenberg, A. (2004). Capacity and comprehension: Spontaneous stereotyping under cognitive load. *Social Cognition, 22*, 292-309. doi: 10.1521/soco.22.3.292.35967
- Wortley, S. (1999). A northern taboo: Research on race, crime, and criminal justice in Canada. *Canadian Journal of Criminology, 41*, 261-274.
- Wortley, S., & Tanner, J. (2003). Data, denials, and confusion: The racial profiling debate in Toronto. *Canadian Journal of Criminology and Criminal Justice, 45*, 367-389. doi: 10.3138/cjccj.45.3.367

Yoshida, E. (2009). *Impacts of implicit normative evaluations on stereotyping and prejudice*. (Doctoral dissertation). Retrieved from http://uwspace.uwaterloo.ca/bitstream/10012/4711/1/Yoshida_Emiko.pdf

Appendices

Appendix A

A Sample of Shooting Task Stimuli

Appendix C

Symbolic Racism Scale (SRS)

1. It's really a matter of some people not trying hard enough; if Blacks would only try harder they could be just as well off as Whites.

1	2	3	4
Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree

2. Irish, Italian, Jewish, and many other minorities overcame prejudice and worked their way up. Blacks should do the same.

1	2	3	4
Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree

3. Some say that Black leaders have been trying to push too fast. Others feel that they haven't pushed fast enough. What do you think?

1	2	3
Trying to push too fast	Going too slowly	Moving at the right speed

4. How much of the racial tension that exists in Canada today do you think Blacks are responsible for creating?

1	2	3	4
All of it	Most	Some	Not much at all

5. How much discrimination against Blacks do you feel there is in Canada today, limiting their chances to get ahead?

1	2	3	4
A lot	Some	Just a little	None at all

6. Generations of slavery and discrimination have created conditions that make it difficult for Blacks to work their way out of the lower class.

1	2	3	4
Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree

7. Over the past few years, Blacks have gotten less than they deserve.

1	2	3	4
Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree

8. Over the past few years, Blacks have gotten more economically than they deserve.

1	2	3	4
Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree

Appendix D

Adjective Checklist

Instructions: Please select the adjectives that you feel best describe the *cultural stereotypes* surrounding Black/White people. In other words, when you think of other people, how do you think they perceive Black/White people? You may choose as many adjectives as you wish. Keep in mind that this is not a measure of your personal beliefs towards a specific racial group, but rather your views of existing cultural stereotypes.

☐ Immoral	☐ Hostile	☐ Frightening	☐ Loud	☐ Confident
☐ Criminal	☐ Unfriendly	☐ Dangerous	☐ Assertive	☐ Opportunistic
☐ Pushy	☐ Unapproachable	☐ Violent	☐ Arrogant	
☐ Intimidating	☐ Cold	☐ Aggressive	☐ Noisy	

Instructions: Please select the adjectives that you feel best describe your own *personal beliefs* about Black/White people. You may choose as many adjectives as you wish.

☐ Immoral	☐ Hostile	☐ Frightening	☐ Loud	☐ Confident
☐ Criminal	☐ Unfriendly	☐ Dangerous	☐ Assertive	☐ Opportunistic
☐ Pushy	☐ Unapproachable	☐ Violent	☐ Arrogant	
☐ Intimidating	☐ Cold	☐ Aggressive	☐ Noisy	

Appendix E

Motivation to Control Prejudiced Reactions Scale (MCPRS)

1. In today's society it is important that one not be perceived as prejudiced in any manner.
1	2	3	4	5
Strongly Disagree				Strongly Agree
2. I always express my thoughts and feelings, regardless of how controversial they might be.*
1	2	3	4	5
Strongly Disagree				Strongly Agree
3. I get angry with myself when I have a thought or feeling that might be considered prejudiced.
1	2	3	4	5
Strongly Disagree				Strongly Agree
4. If I were participating in a class discussion and a Black student expressed an opinion with which I disagreed, I would be hesitant to express my own viewpoint.
1	2	3	4	5
Strongly Disagree				Strongly Agree
5. Going through life worrying about whether you might offend someone is just more trouble than its worth.*
1	2	3	4	5
Strongly Disagree				Strongly Agree
6. It's important to me that older people not think I'm prejudiced.
1	2	3	4	5
Strongly Disagree				Strongly Agree
7. I feel it's important to behave according to society's standards.
1	2	3	4	5
Strongly Disagree				Strongly Agree
8. I'm careful not to offend my friends, but I don't worry about offending people I don't know or don't like.*
1	2	3	4	5
Strongly Disagree				Strongly Agree

Note. * indicates that the item is reverse-scored, so that higher numbers would reflect a stronger motivation to control prejudice.

9. I think that it is important to speak one's mind rather than to worry about offending someone.*
1	2	3	4	5
Strongly Disagree				Strongly Agree
10. It's never acceptable to express one's prejudices.
1	2	3	4	5
Strongly Disagree				Strongly Agree
11. I feel guilty when I have a negative thought or feeling about a Black person.
1	2	3	4	5
Strongly Disagree				Strongly Agree
12. When speaking to a Black person, it's important to me that he/she not think I'm prejudiced.
1	2	3	4	5
Strongly Disagree				Strongly Agree
13. It bothers me a great deal when I think I've offended someone, so I'm always careful to consider other people's feelings.
1	2	3	4	5
Strongly Disagree				Strongly Agree
14. If I have a prejudiced thought or feeling, I keep it to myself.
1	2	3	4	5
Strongly Disagree				Strongly Agree
15. I would never tell jokes that might offend others.
1	2	3	4	5
Strongly Disagree				Strongly Agree
16. I'm not afraid to tell others what I think, even when I know they disagree with me.*
1	2	3	4	5
Strongly Disagree				Strongly Agree
17. If someone who made me uncomfortable sat next to me on a bus, I would not hesitate to move to another seat.
1	2	3	4	5
Strongly Disagree				Strongly Agree

Appendix F

Stimuli used in the race-IAT

Black Faces

White Faces

Appendix G

Demographic Questionnaire

1. Current Age: _____
2. Gender:
_____ Male
_____ Female
3. Do you consider yourself to be a member of a visible minority?
_____ Yes
_____ No
4. If yes, please check which group(s) to which you belong:
_____ White
_____ Black
_____ Asian
_____ Middle Eastern
_____ Aboriginal
_____ Other (please specify): _____
_____ Prefer not to answer
5. Please identify your highest level of education:
_____ High School
_____ Community college or CEGEP diploma
_____ Bachelor's degree
_____ Graduate or professional degree
_____ Doctorate
_____ Other (please specify): _____
6. If you are currently attending university, please identify the degree program in which you are currently enrolled (e.g., B.A. in Criminology, law clerk program, etc.):
_____.
7. If you are currently attending university, please identify your current level of study:
_____ 1st year
_____ 2nd year
_____ 3rd year
_____ 4th year
_____ Other (please specify): _____.
8. Approximately how many hours per week do you play videogames that involve some type of shooting component (e.g., first-person shooter games)? _____.

9. Do you have any current or previous law enforcement experience?

_____ Yes
_____ No

10. If yes, please describe your law enforcement experience:

Department served/hired by _____.

Years served as a sworn officer _____.

Current rank _____.

11. Approximately how many hours of training have you received on firearms training (e.g., target practice, FATS training, simunition, etc.)? _____.

12. For those with law enforcement experience, how many shooting incidents have you been involved in while on duty: _____.

13. For those with law enforcement experience, how many shots have you fired while on duty: _____.

14. To what extent do you interact with Black people?

1	2	3	4	5
Not at all				Extremely Often

15. To what extent do you interact with White people?

1	2	3	4	5
Not at all				Extremely Often

16. How would you characterize your experiences with Black people?

1	2	3	4	5
Extremely Negative				Extremely Positive

17. How would you characterize your experiences with White people?

1	2	3	4	5
Extremely Negative				Extremely Positive

Appendix H

Informed Consent Form: Study 1

The purpose of an informed consent is to ensure that you understand the purpose of the study and the nature of your involvement. The informed consent must provide sufficient information such that you have the opportunity to determine whether you wish to participate in the study.

Study Title: The Identification of Factors that Influence Shooting Decisions

Faculty Sponsor: Dr. Craig Bennell	Phone: 520-2600.1769	EMAIL: craig_bennell@carleton.ca
Principal Investigator: Alyssa Taylor	Phone: 520-2600.1728	EMAIL: ataylor5@connect.carleton.ca

If you have any ethical concerns about how this study is conducted, please contact Dr. Monique Sénéchal (Chair of the Carleton University Ethics Committee for Psychological Research, 520-2600, ext. 1155) or Dr. Janet Mantler (Chair of the Department of Psychology at Carleton University, 520-2600, ext. 4173).

Purpose and Task requirements: The aim of the present study is to identify factors that influence shooting behaviour. You will be exposed to an experimental task on a computer where you will be asked to make shoot/don't shoot decisions based on whether or not you encounter an armed or unarmed target who will either be a Black or White individual. Depending on your performance on this task, you may be eligible to win a monetary reward. After you have completed the experimental task, you will be asked to complete a range of computerized questionnaires. The entire process should take no longer than 30 minutes.

Potential risk/discomfort. You will be viewing scenes where a Black or White target may be holding a mock-handgun and you will be asked to make shoot/don't shoot decisions. It is possible that these scenes may be disturbing to view and that you may be uncomfortable making shooting decisions. We would like to stress that all of the stimuli that you view have been created for the purpose of this study and that none of the weapons used in these photos are real. However, in order to participate in this study you should feel comfortable viewing these images and making these decisions.

Right to withdraw and confidentiality. Your participation in this study is entirely voluntary. At any point during the study you have the right to withdraw and there will be no penalty whatsoever. The data collected in this experiment are confidential. None of the questionnaire or shooting data will be identifiable and it will not be used for research and/or teaching purposes.

I have read the above description of the study entitled "The Identification of Factors that Influence Shooting Decisions". The data collected will be used for research and/or teaching purposes. Clicking on continue below indicates that I agree to participate in the study, and this in no way constitutes a waiver of my rights.

Appendix I

Debriefing Form: Study 1

We would like to thank you for participating in this study. Your time and efforts are greatly appreciated! This post-session information is to help you understand the nature of this research.

The current study is an attempt to determine whether target race influences shooting decisions. You were shown photos of armed and unarmed Black and White suspects and were asked to make split-second decisions as to whether or not you would shoot the suspect. Previous research has found that participants often rely on pre-existing racial stereotypes to make shoot/don't shoot decision (e.g., that Black individuals are more dangerous than White individuals) even though target race is not related to the dangerousness of a situation. This can result in inaccurate decision making. For example, in previous studies, community members have been shown to be more likely to shoot unarmed Black suspects compared to unarmed White suspects.

To determine whether your attitudes towards people of different races relates to your shooting performance, you completed a range of explicit and implicit attitude measures, as well as a measure of your desire to control prejudice. Explicit attitude measures simply ask you to report your views. Because these measures can be biased by a desire to respond in a socially desirable way, we also used an implicit measure of attitudes known as the implicit association test. Unlike explicit tests, implicit tests do not rely on self-reported attitudes. Instead, they rely on reaction times as a proxy for your unconscious attitudes. Essentially, if you associate Black people with danger, you would have found it easier to categorize stimuli into categories when Black and dangerous were paired together (vs. White and dangerous) and this would be reflected in quicker reaction times in this condition. The next phase of this research, if race is found to influence shooting decisions, will be to explore a training strategy to minimize participants' focus on target race and maximizing their focus on weapon presence.

This research program has important theoretical implications. For example, we will learn whether stereotypes about Black people translate into biased behaviour in settings where the stakes can be very high (i.e., shooting scenarios). In addition, we will learn about ways that people can control their responses to stereotypes so that inappropriate decisions are not made. This research also has practical value. For example, the studies we conduct have the potential to inform use of force training programs, allowing police officers to receive higher quality training. Better training should result in more justifiable shooting decisions, which will ultimately enhance public safety.

To learn more about this research, you can read the following articles:

Correll, J. Park, B., Judd, C. H. & Wittenbrink, R. (2002). The police officer's dilemma: Using ethnicity to disambiguate potentially threatening individuals. *Journal of Personality and Social Psychology*, 83, 1314-1329.

Correll, J., Park, B., Judd, C. M., Wittenbrink, B., Sadler, M. S., & Keese, T. (2007). Across the thin blue line: Police officers and racial bias in the decision to shoot. *Journal of Personality and Social Psychology*, 92, 1006-1023.

If you have any questions or comments, please feel free to contact Dr. Craig Bennell (520-2600 x. 1769). If you have any ethical concerns about this study, please contact Dr. Monique Sénéchal (Chair of the Carleton University Ethics Committee for Psychological Research, 520-2600 x. 1155) or Dr. Janet Mantler (Chair of the Department of Psychology at Carleton University, 520-2600 x. 4173). If you are anxious after this study, please contact Carleton University's Health and Counseling Services (613-520-6674) or the Health Centre at the Ontario Police College.

Appendix J

A Sample of the Complexity Shooting Task Stimuli for Study 2