Toward a Comprehensive Understanding of Officers' Shooting Decisions: No Simple Answers to This Complex Problem

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Toward a Comprehensive Understanding of Officers' Shooting Decisions: No Simple Answers to This Complex Problem

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Police officers make life-or-death shooting decisions in complex situations under extreme time pressure. If officers make a mistake, there are dire consequences—they could kill an innocent or be killed themselves. In contrast to prior work's near-exclusive focus on suspect race, the present study examined features of methodology, officers, suspects, and neighborhoods that may affect officers' shooting decisions. Empirical exploration of officers' shooting decisions and mistakes is still in its infancy, and given the seriousness and importance of this phenomenon—and the potential for this research to inform policy decisions—additional research is needed.

When police officers make shooting mistakes, there are dire, immediate consequences for public safety. If officers mistakenly shoot an unarmed target, an innocent person is harmed. If officers fail to shoot an armed criminal, they leave themselves and others vulnerable. For these reasons, understanding the variety of factors that may affect shooting mistakes is a key research objective. Recent well-publicized instances of shooting mistakes, such as the case of Amadou Diallo, in which White police officers shot and killed a Black, unarmed suspect, captured the attention and interest of the general public, law enforcement, public policy analysts, and social scientists. These cases were sensationalized in the media, and questions abounded about the overall likelihood of shooting mistakes and whether suspect characteristics, particularly the race of the suspect, affected mistakes. Of particular concern was the troubling possibility that race loomed large in White officers' split-second shooting decisions. Charges of intentional racism infused the airwaves in the public debate surrounding such incidents. Even if the bias were unintentional, such race biases would leave unarmed Black suspects more vulnerable than their unarmed White counterparts.

In response to the clarion call for answers to questions about the role that race plays in shooting decisions, social psychologists began developing paradigms to carefully explore the role of suspect race and other factors. A careful review of the existing research on shooting decisions, however, reveals some methodological and theoretical issues that limit how much this work can inform our understanding of real-world shooting decisions (and mistakes). For example, much of the extant research uses undergraduate participants. Although potentially useful for exploring mechanisms underlying race biases, undergraduates do not have the training or experience of officers who are, by virtue of their role, sworn to protect and defend all citizens. In addition, the majority of studies use static pictures as the stimuli, and these stimuli do not reflect the dynamic context in which such shooting decisions are made. Also potentially limiting is the fact that researchers have relied on keyboard responses as a stand-in for shooting

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responses—not shooting requires inaction, not a "don't shoot" keyboard response. Together, these circumstances create psychological experiences that may not match those of a police officer making a decision as to whether to shoot a suspect or the process involved in enacting a shooting response (i.e., move trigger finger from the low ready position on the barrel of the gun to the trigger). Further, past shooter bias work has focused almost exclusively on suspect race, to the near exclusion of other variables (e.g., neighborhood context) that likely influence shooting decisions. In the present work, our goal was to overcome some of these methodological and theoretical limitations to advance our understanding of shooting decisions. To set the stage, we provide a brief review of existing shooter bias research.

Suspect Race

Social psychologists have most often explored the effect of suspect race on shooting decisions (e.g., Correll, Park, Judd, & Wittenbrink, 2002; Plant, Peruche, & Butz, 2005). Following high-profile incidents of officers killing unarmed Black men, investigators designed computer simulations to evaluate the effect of suspect race on shooting decisions. In these programs, people play the role of police officers charged with "shooting" at still pictures of armed criminals by pressing keyboard buttons to register "shoot" and "don't shoot" responses. In this task, laypeople mistakenly "shoot" more unarmed Black suspects than unarmed White suspects and "shoot" armed Black suspects faster than armed White suspects (Correll et al., 2002; Plant et al., 2005). Police officers sometimes display a similar pattern, with a bias toward shooting Black suspects more than White suspects (Ma et al., 2013; Plant & Peruche, 2005; Sim, Correll, & Sadler, 2013), but sometimes show race bias only in speed of responses, not mistakes (Correll et al., 2007; Sim et al., 2013). Other recent work using video clips instead of still images found a reversed race bias, with both officers and laypeople being slower to shoot armed Black than White or Hispanic suspects and being more likely to mistakenly *not* shoot Black than White or Hispanic armed suspects (James, Vila, & Daratha, 2013). These inconsistent patterns of bias highlight the need for additional investigation. Further, the differences between officers and nonofficers are important, because they indicate that findings from nonofficer samples cannot be generalized to law enforcement personnel. If the goal is to understand shooting decisions and mistakes made by police officers, at the very minimum, patterns observed with nonofficer samples must be tested with police officer samples.

Physical Environment and Neighborhood

In addition to suspect race, Correll, Wittenbrink, Park, Judd, and Goyle (2011) investigated the physical environment's influence on shooting by imbedding suspects within "threatening" (e.g., an alleyway) or "neutral" (e.g., a park) environments. Undergraduates showed race bias only in the neutral environments (i.e., shooting more unarmed Black than White suspects). In the threatening environments, the number of errors for unarmed White suspects increased (compared to the neutral environments) and matched the number of errors for unarmed Black suspects.

It is important to note that this work focused on generic environments, rather than known, familiar environments, which bring with them a richer set of ecological variables, and specific reputations that may be known to officers. Correll and colleagues used environmental cues to signal relative threat (dark alley) or safety (park in daylight) for their undergraduate participants. Officers, however, patrol real-world neighborhoods, and unlike generic locations, real-world neighborhoods have reputations of relative safety or danger. Reputation is important; depending on its location within a city, a park could be dangerous or an alleyway could be safe. Police officers have specific knowledge and expectations about neighborhoods (Stroshine, Alpert, & Dunham, 2008). Through training and experience, they learn their beats well and adapt their policing style accordingly (Rubinstein, 1973). Neighborhoods with violent reputations may elicit more aggressive responses, and neighborhoods with safe reputations may cause officers to reduce their guard. Neighborhood characteristics likely influence the mistakes officers make when they decide whether to pull the trigger.

Terrill and Reisig (2003) examined the influence of neighborhood on police officers' use of force. Researchers rode along with officers working 24 different beats, recording details of more than 1,200 police–citizen encounters. They coded each incident for a number of variables, including the neighborhood, the amount of force used, and demographics of the officers, criminal suspects, and victims. Officers treated non-White suspects with more force than White suspects, but this was fully mediated by neighborhood. When taking neighborhood into account, suspect race had no influence on the amount of force used; police were more forceful in disadvantaged neighborhoods, regardless of suspect race. This correlational work identifies neighborhood as crucial for understanding police–citizen interactions (Werthman & Piliavin, 1967), but neighborhood characteristics' effects on shooting mistakes have not been examined experimentally.

Neighborhood racial makeup may also interact with the officers' race to affect shooting decisions. Some police departments assign officers to work in same-race neighborhoods, and this results in fewer arrests (Donohue & Levitt, 2001), presumably because officers diffuse tense situations with less force when dealing with same-race citizens. Interracial interactions (e.g., an officer patrolling an other-race neighborhood) produce anxiety, even when they are merely anticipated (e.g., Crocker, Major, & Steele, 1998; Page-Gould, Mendoza-Denton, & Tropp, 2008; Plant & Devine, 2003; Trawalter, Richeson, & Shelton, 2009). Moreover, entering a context in which one is a minority harms performance on a variety of tasks for both White and non-White people (e.g., Katz & Greenbaum, 1963; Thompson & Sekaquaptewa, 2002). In sum, neighborhood appears to be a crucial component of police work that may affect shooting decisions, and we incorporate neighborhood into the present exploration of officers' shooting decisions.

THE PRESENT RESEARCH

The present work explores the influence of suspect race, officer race, and neighborhood characteristics on officers' shooting mistakes. White and non-White police officers were randomly assigned to complete a shooter task imbedded in one of two local neighborhoods: a predominantly non-White, high-crime lower socioeconomic status (SES) neighborhood or a predominantly White, low-crime, higher SES neighborhood.[1] Their goal was to distinguish between armed and unarmed suspects (half White, half Black) and to shoot the armed criminals.

Whereas the majority of past work used keyboard keys (e.g., Correll et al., 2007) or joystick buttons (Glaser & Knowles, 2008) to represent "shoot" and "don't shoot" decisions, our task used a realistic gun apparatus (see also James, Vila, & Daratha, 2013). To shoot, the officers pulled the gun's trigger, and to not shoot, the officers refrained from shooting, similar to a go/no go task (e.g., Nosek & Banaji, 2001). Updating the task with a gun apparatus provides a clearer estimate of "don't shoot" responses, because failing to respond at all—"timing out"—is a possible real-world response. It is worth noting that not shooting is the default response—officers hold their weapon at the "low ready," with their finger on the barrel of their handgun, off the trigger (Figure 1). Shooting requires an action and not shooting requires inaction. Two possible mechanisms can lead to not shooting: An officer can decide not to shoot or can fail to make any decision. Pressing a keyboard key representing "don't shoot" is discordant with not shooting; it requires an action

[1]For simplicity, we call these the "non-White neighborhood" and the "White neighborhood.".

FIGURE 1 Gun apparatus used to collect behavioral shooting responses in the updated shooter paradigm. *Note.* Held in a "ready stance."

(i.e., behavioral activation) to represent inaction (e.g., behavioral inhibition). The consequences of mistakenly not shooting are equal whether caused by decision or indecision—the officers and others are left vulnerable. Our methodology reflects that reality.

Most prior shooter bias work has used still pictures as stimuli, but James et al. (2013) used dynamic video stimuli to increase the realism of the shooter task. In a real shooting situation, making a shooting decision involves more than merely identifying a static object—a suspect may pull an object from within a jacket or pocket, and an officer may need to determine quickly whether the moving object is a gun. In the present work, we used both dynamic video stimuli and the still pictures used by previous work, enabling us to observe differences or similarities between the stimulus types.

METHOD

Participants and Design

White experimenters worked with the City of Madison Police Department and collected data from as many officers as we could recruit in a 10-week period. Fifty-six officers participated in exchange for $5 gift cards. Data for two officers were not recorded because of equipment malfunction, resulting in usable data for 54 officers (15 female, 39 male; 39 White, 12 Black, 1 Hispanic, 1 Hawaiian, 1 race not reported). Officers participated while on duty, in a private office set up inside each of the city's five police stations.

Officers participated one at a time and were randomly assigned to complete the shooter tasks nested either within a local non-White neighborhood ($n = 26$, seven non-White officers, 19 White) or a local White neighborhood ($n = 28$, seven non-White officers, 20 White, one not reported).

Apparatus

A realistic plastic gun collected shoot responses using a button affixed to the gun in place of the trigger, connected to the computer via a PS/2 connector. The experimenters instructed the officers to keep the gun apparatus unholstered and hold it as they normally hold their gun when approaching a situation with armed criminals, as in this task (i.e., at the "low ready;" see again Figure 1).

Shooter Program

Setup and neighborhood manipulation. The shooter task was modified from Plant et al. (2005). The instructions explained that the officers were responding to a call and that "dangerous criminals with guns" were nearby. These instructions specified in advance what the exact locations would be, by providing specific neighborhood designations (i.e., cross-streets; "in the ___ Road neighborhood"), nested within the neighborhood's general area of the city (i.e., cardinal quadrant; "on the ___ Side"). Neither the experimenters nor the program text mentioned anything about the neighborhoods' racial makeup or typical crime rate. Any expectations about the neighborhood had to come from the officers' prior experience and knowledge.

According to the U.S. Census (2000), the non-White neighborhood we selected is predominately non-White (44% Black/Hispanic, 34% White, 21% Asian/Other), whereas the White neighborhood is predominately White (72% White, 18% Asian). Although we randomly assigned officers to neighborhood race conditions, the neighborhoods were real locations, thus conflating the racial makeup of the neighborhoods with other variables as well. Throughout the United States, neighborhood racial demographics are correlated with SES and crime rates, with Black/Hispanic neighborhoods having more crime than White/Asian neighborhoods (Hipp, 2007; Quillian & Pager, 2001; Taub, Taylor, & Dunham, 1984). This nationwide trend holds true in the neighborhoods we selected. According to the Neighborhood Indicators Project (City of Madison, 2010), the non-White neighborhood is higher in crime (in 2010, the number of reported crimes fell into the following ranges: crimes against persons = 83–89, property = 160–409, and society = 399–507), and the White neighborhood is lower in crime (against persons = 0–11, property = 0–35, and society = 0–60; i.e., the lowest ranges possible in the Neighborhood Indicators Project's metric). Thus, any effects of the neighborhood variable could reflect either the crime rate or the racial makeup of the neighborhood.

Picture blocks. The program text told the officers that they should shoot armed men and refrain from shooting unarmed men. The program presented 20 practice trials, followed by three test blocks of 40 trials each. There was a break after each block, during which the program reiterated the instructions and reminded officers of the neighborhood they were "patrolling."

Each trial had two parts: a location prime and a picture of a suspect. The location primes were pictures taken in the early evening in a prominent location (e.g., a large house or apartment building) on major streets in the corresponding neighborhood. The pictures were not explicitly labeled as being in a given neighborhood, but the locations in the pictures were prominent enough to be easily recognizable to anyone with even passing familiarity with the neighborhoods in question. We selected pictures that were similar in visual complexity and digitally matched in their illumination. The suspect pictures were taken from Plant et al. (2005). Each suspect picture was a headshot of a White or Black male with a picture of either a gun or a neutral object (e.g., wallet) superimposed on the headshot so that the face was still visible (for examples, see Plant et al., 2005, Appendix A).

The location prime appeared by itself for 150 ms, then a suspect picture appeared, superimposed over the location prime in a random position. Each picture type (Black Gun, Black No Gun, White Gun, White No Gun) had an equal likelihood of appearing (i.e., Black and White suspects were equally likely to be armed). The picture remained until the officer pulled the trigger or for 350 ms if he or she did not shoot. Pretesting revealed that timeout windows longer than 350 ms were too easy for officers. If the officer failed to shoot an armed suspect before the time-out or shot an unarmed suspect, a red "ERROR" message appeared on the screen.

Video blocks. The video blocks followed the picture blocks. To obtain the stimuli, we recruited young men as actors (5 Black, 5 White). They wore tee shirts under a dark jacket. Using a gun or a neutral object (i.e., a cell phone, soda can, or wallet), they slowly performed a series of choreographed movements (e.g., pulling the object out of their coat pockets, turning around, pulling the object out of their back pants pocket) in front of a blank wall. We cut the video clips so that they were 2 s long, so that at the start of each video clip the object was not visible, and so that at the end of clip it was fully visible. We then accelerated the speed of the videos so that they were 630 ms long. We selected the final videos such that each of the ten actors was equally likely to appear with a gun or a neutral object, performed identical actions with each, and was matched for attractiveness and age with an other-race actor who performed the same sets of actions with the same items.

There was a practice block with 20 trials, followed by two test blocks of 40 trials each. The video trials used the same location primes as the picture trials. The location primes appeared for 200 ms before the video appeared, superimposed at a random location on top of the prime. Technological limitations precluded presenting the video stimuli with millisecond-precise start times; therefore we set the trial timeout for 1300 ms after the initiation of the video file, allowing the digital video files enough time to spool, start, and finish before the time-out. The latencies used in the following analyses reflect response times measured from the start of this 1300 ms response window.

Questionnaire and Manipulation Check

After the simulation, the officers completed a questionnaire collecting standard demographic information (e.g., race, gender, age, education level) and information relevant to police experience. We included an open-ended manipulation check, verifying that the officers knew which neighborhood they were patrolling in the program. All the officers correctly reported the neighborhood they were patrolling, except one who skipped that page of the questionnaire.

RESULTS

As in previous work, we examine both reaction times and error rates in the present data, first for the still picture blocks, then for the video blocks. The error rates correspond to the mistakes officers make, which can either be mistakenly shooting an unarmed suspect (which would yield higher error rates for the No Gun trials) or failing to shoot an armed suspect (which would correspond to higher error rates on the Gun trials). It is the error rates, therefore, that are best able to inform our thinking about real-world shooting mistakes. The reaction times, on the other hand, may provide some insights into cognitive processes that influence shooting decisions. We note where the findings do and do not replicate existing research.

All experimental data and materials are available online at http://www.sciencecox.com/pub/mpd. See Table 1 for descriptive statistics, and see the Appendix for signal detection statistics.

Picture Blocks

Error rates. For each trial type, we computed a percentage error rate by dividing the number of incorrect responses by the total number of trials (e.g., if an officer encountered 20 Black-Gun picture trials and failed to shoot on four of them, their percentage error rate would be 20%, or 0.2), excluding the 20 practice trials.

We submitted the percent error rates to a 2 (Suspect Race: White vs. Black) × 2 (Object: Gun vs. No Gun) × 2 (Officer Race: White vs. non-White) × 2 (Neighborhood Race: White vs. non-White) mixed analysis of variance (ANOVA) with suspect race and object as within-subjects factors and officer race and neighborhood race as between-subjects factors. See Table 2 for the full report of all effects. There was a large main effect of object, revealing more errors for Gun than No Gun trials, $F(1, 50) = 243.048$, $p < .001$, $\eta^2 = 0.961$, indicating a tendency to err on the side of failing to shoot armed suspects, rather than mistakenly shooting unarmed suspects. The Suspect Race × Object

TABLE 1
Means and Standard Deviations of Percentage Error Rates

			Gun		*No Gun*		
Stimulus Type	*Officers*	*Neighborhood*	*White*	*Black*	*White*	*Black*	*All Trial Types*
Picture trials	Nonwhite	White	0.59 (0.198)	0.59 (0.231)	0.04 (0.033)	0.06 (0.067)	0.32 (0.086)
		Non-White	0.46 (0.154)	0.45 (0.180)	0.03 (0.053)	0.03 (0.033)	0.24 (0.081)
	White	White	0.50 (0.182)	0.51 (0.208)	0.04 (0.044)	0.05 (0.048)	0.28 (0.086)
		Non-White	0.61 (0.201)	0.61 (0.190)	0.04 (0.053)	0.04 (0.038)	0.33 (0.083)
	All	White	0.52 (0.188)	0.53 (0.213)	0.04 (0.041)	0.06 (0.052)	0.29 (0.087)
		Non-White	0.57 (0.199)	0.57 (0.198)	0.04 (0.052)	0.04 (0.036)	0.30 (0.089)
Video trials	Nonwhite	White	0.15 (0.115)	0.14 (0.154)	0.24 (0.094)	0.12 (0.142)	0.16 (0.070)
		Non-White	0.16 (0.085)	0.10 (0.159)	0.14 (0.099)	0.04 (0.055)	0.11 (0.064)
	White	White	0.13 (0.128)	0.16 (0.155)	0.20 (0.122)	0.16 (0.155)	0.15 (0.062)
		Non-White	0.28 (0.232)	0.29 (0.252)	0.16 (0.082)	0.05 (0.060)	0.19 (0.106)
	All	White	0.14 (0.122)	0.15 (0.152)	0.21 (0.114)	0.11 (0.104)	0.15 (0.063)
		Non-White	0.24 (0.208)	0.24 (0.242)	0.15 (0.085)	0.05 (0.058)	0.17 (0.102)

TABLE 2
Analysis of Variance Statistics

	Picture Blocks			*Video Blocks*		
	F(1, 50)	*p*	η^2	*F(1, 50)*	*p*	η^2
Suspect race	0.162	.689	<0.001	40.404	<.001	0.169
Suspect Race × Neighborhood	0.439	.511	<0.001	2.529	.118	0.011
Suspect Race × Officer Race	0.165	.686	<0.001	0.494	.485	0.002
Suspect Race × Neighborhood × Officer Race	0.006	.938	<0.001	0.060	.807	<0.001
Object	243.048	.000	0.961	1.741	.193	0.098
Object × Neighborhood	0.001	.975	0.001	1.462	.232	0.082
Object × Officer Race	0.305	.583	0.000	3.780	.058	0.212
Object × Neighborhood × Officer Race	3.460	.069	0.014	0.728	.398	0.041
Suspect Race × Object	0.328	.570	<0.001	15.660	<.001	0.107
Suspect Race × Object × Neighborhood	0.125	.725	<0.001	0.817	.370	0.006
Suspect Race × Object × Officer Race	0.470	.496	<0.001	0.451	.505	0.003
Suspect Race × Object × Neighborhood × Officer Race	0.082	.776	<0.001	0.375	.543	0.003
Neighborhood	0.189	.666	0.002	0.006	.938	<0.001
Officer race	0.756	.389	<0.001	1.994	.164	0.062
Neighborhood × Officer Race	5.619	.022	0.014	3.501	.067	0.108

interaction (the typical test of shooter bias) was not significant, $F(1, 50) = 0.001$, $p = .570$, $\eta^2 < 0.001$, indicating that officers did not display a racial bias in the type of mistakes made. This pattern replicates Correll and colleagues' (2007) work with officers showing no racial bias in errors but fails to replicate studies where officers responded with a racial bias in errors.

Officer race significantly interacted with neighborhood race, $F(1, 50) = 5.619$, $p = .022$, $\eta^2 = 0.014$, revealing that when officers went to an other-race neighborhood, they made more errors. We speculate that entering an other-race neighborhood may undermine the officers' shooting performance because interracial interactions produce stress and anxiety (Crocker et al., 1998; Page-Gould et al., 2008; Plant & Devine, 2003; Trawalter et al., 2009) or because being in a situation in which one is a minority harms performance (Katz & Greenbaum, 1963). We cannot assess this speculation directly in the present data, however, because we included no measures of stress or anxiety. Another limitation for interpretation of this effect is the small number of non-White officers in our sample. We believe, however, that their inclusion is theoretically meaningful, especially given that their patterns of errors are complementary to those of the White officers. As previously mentioned, neighborhood race is conflated with, for example, neighborhood crime rates. This interaction of officer race and neighborhood, however, suggests to us that neighborhood race (rather than, e.g., neighborhood crime rate) is the key feature of the neighborhood variable in this work. It is difficult to generate a plausible explanation for officer race interacting with the neighborhood's crime rate.

We tested a wide array of other officer variables, such as gender, age, experience on the police force, and neighborhood congruence (i.e., whether the officer was in the condition congruent with his or her usual station) on errors, but there were no main effects or interactions involving these variables, all Fs < 1.581, ps $> .200$, η_p^2 s < 0.150.

Latencies. We also examined latency data. Because incorrect Gun trials and correct No Gun trials have latencies of precisely 350 ms (the length of the time-out window), we analyzed latencies only for correct gun trials (i.e., trials in which officers correctly shot an armed criminal). We did not transform the latencies, because they were normally distributed, Shapiro-Wilk Ws < 0.980, ps $> .083$. We conducted a 2 (suspect race) × 2 (neighborhood race) × 2 (officer race) mixed ANOVA.

The sole significant effect was a main effect of suspect race, $F(1, 50) = 8.217$, $p = .006$, $\eta^2 = 0.196$. Officers correctly shot armed Black suspects ($M = 289$ ms, $SD = 21.6$) faster than armed White suspects ($M = 294$ ms, $SD = 18.7$). Although the statistical effect size of this 5-ms mean difference ($d = 0.25$) is small (Hyde, 2005), this pattern replicates Correll and colleagues' (2007) findings, in which officers correctly "shot" faster on black-gun than white-gun trials. The differences between the latency data and error rate data in this study may reflect the disconnection between the *activation* and *application* of a stereotypic association (Devine, 1989; Gilbert & Hixson, 1991; see Cox, Abramson, Devine, & Hollon, 2012). Perhaps all Black suspects *activated* the *Black–Criminal* stereotype, facilitating the correct shoot responses for armed Black suspects (cf. Payne, 2001), but the skilled officers refrained from *applying* it with unarmed suspects, thereby avoiding race bias in errors.

Video Blocks

Error rates. We conducted a Suspect Race × Object × Officer Race × Neighborhood Race mixed ANOVA for the error rates of the video blocks. See again Table 1. Only the main effect of suspect race, $F(1, 50) = 40.404$, $p < .001$, $\eta^2 = 0.169$, and the Suspect Race × Object interaction, $F(1, 50) = 15.660$, $p < .001$, $\eta^2 = 0.107$, were significant. The interaction revealed that officers made very few errors on unarmed Black suspects relative to armed suspects or unarmed White suspects. We interpret this as indicating that, because they had a longer response window, the officers were better able to exert control, and they were extra cautious about not shooting unarmed Black suspects.

Latencies. We conducted a 2 (suspect race) × 2 (neighborhood race) × 2 (officer race) mixed ANOVA on the correct gun video trials. As in the picture trials, the sole significant effect was a main effect of suspect race, $F(1, 48) = 6.265$, $p = .016$, $\eta^2 = 0.110$. This main effect, however, displayed the opposite pattern of the picture trials, with the correct shoot responses being slightly faster ($d = 0.12$) for White suspects ($M =$ 1207 ms, $SD = 32.7$) than Black suspects ($M = 1211$ ms, $SD = 34.6$). This is consistent with our account of the officers being better able to exert control on the video trials, given the longer response window (cf. Amodio, Devine, & Harmon-Jones, 2008). This pattern also replicates James and colleagues' (2013) study, which is the only other study to have used video stimuli.

DISCUSSION

The shooter bias literature emerged following concerns about racial biases in police officers' shooting decisions after high-profile cases of innocent Black men being shot by police officers. To date, this body of work has produced mixed results, and our research adds to the complexity of this literature. The two primary indicators of bias in this literature—reaction times and error rates—correspond to distinct processes and, accordingly, display distinct patterns in both the present and prior work. Response times are thought to provide insight into the *activation* of stereotypic associations (e.g., *Black–criminal*), which have relevance for understanding certain basic processes involved in the decision to shoot (Correll et al., 2011). Replicating prior work, officers in our sample were faster to shoot armed Black suspects in our picture trials but slower to shoot them in our video trials. Exactly what this reversal in response latencies across the still pictures and dynamic videos means is, at best, unclear. The error rates, which may be the best experimental indicator of real-world shooting mistakes, reveal very different patterns from the reaction times. In the present study, the only form of race bias in error rates that arose occurred in the video blocks and the bias observed reflected officers correctly *not* shooting unarmed Black suspects.

Indeed, the officers made exceedingly few errors with unarmed suspects across the board. The most common type of error they made was failing to shoot armed suspects when they should have. These errors of not shooting may be due to either actively deciding not to shoot or not responding quickly enough. Although it is heartening to see that the officers did not mistakenly shoot innocents, this also means the officers left themselves and others vulnerable to armed and dangerous suspects. More research is needed to unpack the process underlying these failures to shoot. Once understood, it is possible that training could be developed to eliminate this vulnerability of officers patrolling beats.

Suspect race is one of many factors that may influence split-second shooting decisions. Although prior shooter bias research—and the rhetoric around it—often emphasizes the tendency to mistakenly shoot unarmed Black suspects more than unarmed White suspects, no such pattern arose in our work. Although our findings are potentially encouraging, within the broader literature, the evidence as to whether officers display a race bias in their shooting errors is decidedly mixed. Additional research is needed to discover the conditions under which race bias in errors does or does not appear. One such moderating factor that has been identified is how long officers have been on the police force; prior work has shown that racial bias in shooting errors is negatively related to experience as a law enforcement officer (e.g., Correll et al., 2007; Peruche & Plant, 2006). The accumulating evidence suggests that a wide range of personal and situational factors may affect these split-second shooting decisions.

One lesson to learn from the present research is that shooting decisions are not made in a vacuum. To the extent that we would like to generalize to the important real-world context of officer shooting decisions, we need to take seriously the complexity of the circumstances in which shoot or don't shoot decisions are made. For example, our data indicate that the interaction of neighborhood and officer race influences shooting mistakes more than suspect race or any other factor we measured. Specifically, officers were more likely to mistakenly not shoot armed suspects, regardless of suspect race, when they were in other-race neighborhoods. In real life, officers are nested within neighborhoods and cities, and understanding these broader social contexts is central to understanding shooting decisions and shooting mistakes. Added to suspect race, office race, and neighborhoods, we may need to study the effect of time of day, timing within shift, whether violent events have occurred recently in the area patrolled, how suspects are dressed, their SES level, and so on. The emphasis on suspect race to the near exclusion of other variables does a disservice to the complexity, seriousness, and consequentiality of this problem.

The clearest message to emerge from the present work, and experimental shooter bias work generally, is that its storyline has only just begun. Patterns of shooter bias seem to be sensitive to various moderating variables (e.g., neighborhood, officer race) and methodological variations (e.g., picture vs. video stimuli, gun apparatus vs. keyboard responses). Our work shows this across conditions, with the differences between picture and video stimuli, and in comparison to past work. Shooter bias patterns change with variations on the shooting procedure, suggesting that the tasks using less realistic methods do not necessarily capture the same psychological processes as the tasks using more realistic methods. If we want to make shooting research relevant to public policy, we need to take steps to ensure that our findings can be generalized to actual police shooting decisions. Given the seriousness and importance of the problem and our growing understanding of how little we know, much further work is needed before this research can confidently inform our understanding of real-world police shooting mistakes or public policy relevant to them.

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APPENDIX
SIGNAL DETECTION STATISTICS

			White Suspects		*Black Suspects*		*All Suspects*	
Stimulus Type	*Officers*	*Neighborhood*	d'	c	d'	c	d'	c
Picture trials	Nonwhite	White	1.10	1.07	1.00	0.95	1.03	0.98
		Non-White	1.42	0.92	1.37	0.85	1.36	0.86
	White	White	1.25	0.89	1.14	0.85	1.17	0.86
		Non-White	1.07	1.11	1.00	1.07	1.34	0.33
	All	White	1.21	0.94	1.10	0.88	1.13	0.89
		Non-White	1.16	1.06	1.10	1.01	1.09	1.00
Video trials	Nonwhite	White	1.27	−0.17	1.91	0.04	1.48	−0.10
		Non-White	1.54	0.08	2.43	0.08	1.76	0.06
	White	White	1.47	−0.16	1.70	0.14	1.52	−0.03
		Non-White	1.18	0.19	1.69	0.56	0.98	1.06
	All	White	1.41	−0.17	1.76	0.11	1.51	−0.05
		Non-White	1.28	0.16	1.89	0.43	1.45	0.26