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# Supporting social hierarchy is associated with White police officers' use of force

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**Three studies translate social dominance theory to policing, testing the relationship between individual officers' endorsement of social hierarchies and their tendency to use force against residents. This article demonstrates a link between officer psychological factors and force. Because police are empowered to use force to maintain social order, and because White officers hold a dominant racial identity, we hypothesized social dominance orientation (SDO) would relate to force positively for White officers. For Black officers, we hypothesized a weak relationship between SDO and force, if any. To test these predictions, we examined the relationships between SDO and force using negative binomial regression models stratified by officer race. In an eastern city, SDO relates to force incidents positively for White officers and negatively for Black officers. In a southern city, SDO relates to force positively for White officers, and not significantly for Black officers. Stratified by race and rank, a second eastern city shows a marginally significant, positive SDO/force relationship for White patrol officers, and no significant SDO/force relationship for Black patrol officers. Finally, testing our hypotheses on a dataset pooled across these cities revealed a positive SDO/force relationship among White officers, and no significant SDO/force relationship among Black officers. These findings are consistent with our hypotheses and suggest a need to examine the role that maintaining social hierarchies plays in police behaviors. Future research must continue to investigate these relationships, especially with larger samples of non-White officers, and information about officers' patrol environments.**

social dominance | hierarchy | violence | police use of force | order maintenance policing

The death of Amadou Diallo exerted a powerful influence on social psychology. New York Police Officers shot Diallo, a Guinean immigrant, 41 times while he stood in front of his home, holding his wallet. The officers who shot him explained that they thought Diallo was holding a gun. Social psychologists, seeking to explain the role of race in the tragedy, investigated the effects of race on split-second decisions to shoot (1–3). This focus arose partially because time pressure was a well-established risk factor for cognitive errors. In the Diallo shooting, social psychologists saw a social problem that was ripe for psychological study.

Fifteen years later, the fatal shooting of unarmed Black teenager Michael Brown Jr. in Ferguson, Missouri, disturbed the United States again, but with less obvious psychological implications. Brown's death brought attention back to deadly police force and also revealed a limitation of the prevailing explanation: split-second decisions are infrequently involved. Psychological science did not provide an obvious framework for the disparate contexts of Michael Brown Jr., Sandra Bland, and Eric Garner. Does that mean there are no psychological variables relevant to the more recent spate of tragic police-involved killings? Does psychological science have anything useful to add to this urgent public policy issue?

We posit that the answer is yes.

Specifically, we hypothesize that the context of policing, which licenses patrol officers to use force to maintain social order, may be a risk factor in police use of force (4–6). While we are not able to manipulate the context of being on patrol, we can look to differences in officers' beliefs that social order requires social

hierarchy—and to officers' status within the racial hierarchy—as predictors that they will use force to enforce that hierarchy. In this “hierarchy maintenance” framework, we test whether White police officers who endorse social hierarchy are more likely to use force than White officers who do not endorse hierarchy.

We explore this prediction by stratifying officers by race and then examining the link between officers' levels of social dominance orientation (SDO)—the belief that social hierarchies are necessary and good—and their history of using physical force (7, 8). We define force as using one's body or a weapon to compel compliance (9). We stratified officers by race because we predicted that officers with high status in the racial hierarchy, who also support hierarchy, would seek to enforce the hierarchy by using physical force.\* Therefore, we predicted White patrol officers higher in SDO would use force more frequently than White patrol officers lower in SDO. For Black officers, we predicted a weak or nonexistent SDO/force relationship, because their lower status in the American racial hierarchy may confer less motivation to physically enforce existing social hierarchies.

## Significance

**We test whether White police officers who endorse social hierarchies are more likely than less hierarchy-supportive White police officers to use physical force when interacting with residents. In three United States cities, we found that White police officers with relatively higher social dominance orientation (SDO) were more likely than lower-SDO White officers to use force when interacting with residents. Black police officers, who hold a lower-status racial identity, showed non-significant or negative relationships between SDO and use of force. That White officers' orientation toward enforcing hierarchies predicts their rate of force in three cities suggests the need for closer examination of how hierarchy maintenance relates to police use of force.**

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The authors declare no competing interest.

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\*We did not predict or test systematic differences in SDO/force relationships by race in the main analyses for two reasons: one theory-based and one methods-based. First, our strong, a priori hypothesis was limited to White officers: We predicted a positive SDO/force relationship for White officers, and did not hold strong predictions for non-White officers. Second, even if there were an adequate theory basis for testing an interaction between SDO and officer race, we expected statistical power for non-White groups to be limited by smaller sample sizes (reflective of current demographics in American patrol policing). Smaller samples of non-White officers could yield uninformative and/or misleading results. Nevertheless, we have conducted exploratory analysis of this interaction effect in a combined sample of officers from three cities (*SI Appendix, Table S5*). We urge caution in interpreting these results for the reasons described in this note.

**Table 1. Study 1: Exponentiated negative binomial regression coefficients predicting the rate of force incidents per citation, with SDO<sub>75</sub> and rank as predictors and citations as an offset, stratified by officer race**

Predictors	Black officers	Other non-White officers	White officers
SDO <sub>75</sub>	0.606* [0.371, 0.988]	1.155 [0.626, 2.130]	1.793** [1.277, 2.518]
Low vs. high rank (binary)	0.827 [0.302, 2.263]	0.362 [0.071, 1.849]	0.079*** [0.032, 0.194]

95% CIs in brackets. \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

We did not make predictions for non-White, non-Black officers. Previous literature does not point to clear predictions for high-SDO Black or Other non-White officers' (a composite group including Latinx, Asian, Native, or more than one race) use of force, although average levels of SDO are sometimes higher in White officers compared to non-White officers (7). On one hand, in different situations, social dominance theory's behavioral asymmetry and ideological asymmetry hypotheses both predict different patterns of behavior for people in higher—compared to lower—status groups (8). On the other hand, in the United States, SDO is positively associated with explicit anti-Black racism for both White respondents and Black respondents (10), suggesting both White and Black police officers may indeed be motivated to enforce hierarchies. However, neither perspective specifies a prediction for high-SDO White and non-White police officers' use of physical force to maintain hierarchies, so our hierarchy-maintenance predictions for White but not Black officers would provide novel theoretical ground.

To test these predictions, we surveyed officers in an eastern United States city and linked their responses to administrative data, accomplishing the too-rare feat of connecting psychological factors to police behaviors. We then preregistered and conducted two replication studies: one in a southern United States city and one in a second eastern United States city. All three cities studied are midsize to large cities, with more than 100,000 residents. Poverty rates in these cities are between 10% and 25%. One city is majority non-White and two cities are majority White. The three cities span three quartiles of violent crime rates, of 100 most populous United States cities (11, 12). Finally, we assessed robustness by combining samples.

Gaining access to police behavioral data is challenging and the data are often messy. The current studies are no exception. While these three studies were able to test similar constructs, tests were not identical. First, administrative data showed different rates of force across cities, and departments differed in their ability to report officer/resident contact: For example, some departments record every time an officer stopped someone while others record only citations. Second, responsive to the interests of each city, we administered different forms of the SDO questionnaire.<sup>†</sup> To help understand SDO/force relationships across settings, we combined all three samples and tested the SDO/force relationship while controlling for city. Finally, it was not practical to track individual officers after they completed our survey. This means that our predictor variable (SDO) was measured after our outcome variable (use of force). While we neither assume that SDO is invariant over time nor that rates of force could not influence SDO, we still believe that demonstrating a relationship between SDO and police use of force represents an important contribution to the literature, as no previous research to our knowledge has documented a robust relationship between psychological variables and police behaviors.

<sup>†</sup>For example, decreasing survey length was necessary in some cities, in which cases we decided a priori to focus on SDO-D, an SDO subscale, for its emphasis on aggressive hierarchy maintenance. For a parallel measure across studies, all SDO measures used include a Short SDO-D scale, and we reran analyses using the Short SDO-D in *SI Appendix, Tables S1–S4*. We also used the Short SDO-D in the combined sample analyses (see *Combined Sample of Three Cities* section and *SI Appendix, Table S5*).

The surveys measured SDO, other psychological variables, and demographics. In study 1, we tested the relationship between SDO and the number of times officers used force over 5 y. Our analyses are stratified by officer race and include officers' departmental rank. We include the number of citations each officer gave at “Terry” stops during the same time period as an offset, serving as a proxy for officers' opportunities to use force. (In *Terry v. Ohio*, 392 US 1 (1968), the Supreme Court decided police may make forcible stops where they suspect a crime. During these stops, officers have discretion to use force.) With this offset, the dependent variable can be interpreted as a rate of force incidents per citation.<sup>‡</sup>

In study 2, data were insufficient to include a proxy for opportunities to use force. Consequently, we tested the relationship between SDO-Dominance (SDO-D), a subdimension of SDO, and the total number of force incidents, with no offset.<sup>§</sup> To test robustness for SDO/force relationships both with and without an offset, we then analyzed a combined sample of patrol officers across all three cities.

In study 3, we sought to replicate studies 1 and 2 in another eastern United States city. This department collects records for all pedestrian and vehicle stops, which we used as an offset. To test robustness for SDO/force relationships among White patrol officers, our combined analyses across all three cities tested the hypothesized effects among patrol-level officers only.

We also collected racial prejudice measures, enabling tests of the alternative or additional explanation that prejudice predicts police force, as implicit and self-report measures predict other important behavioral outcomes (13, 14). The current research tests whether SDO is associated with use of force by police. Our goal, narrowly, was to determine whether an officer's orientation to hierarchy was associated with their willingness to use force in the service of their job. More broadly, our goal was to explore the potential for psychological approaches to race, violence, and hierarchy to translate to the field of policing, beyond both the laboratory and the domain of split-second decisions.

### Order Maintenance, Authority Maintenance, and Hierarchy Maintenance

The state gives police a monopoly on the right to use force, giving officers power over nonofficer residents (9). Most officers learn that, to stay safe, they must control an interaction, and that to stay in control, they must maintain their moral authority (15, 16). Indeed, perceived threats to an officer's moral authority are associated with stronger support for using unreasonable force (17). Still, little is known about how psychological risk factors relate to officers' behavior (18).

Alpert and Dunham (15) argue that police discretion to use force, coupled with a charge to enforce social order, can

<sup>‡</sup>The offset is a regression parameter whose value is constrained to be 1 (33). Using the exposure variable as an offset allows for the parameterization of the exposure as a predictor with a fixed value. We are not interested in the magnitude of the effect of the offset variable; rather, we are adjusting for unequal opportunities to use force (34). Count models can fail to converge or give unreliable estimates when exposure variables are used as predictors (35).

<sup>§</sup>Study 2 results with the initially intended but insufficient offset appear in *SI Appendix, Table S6*.

**Table 2. Study 2: Exponentiated negative binomial regression coefficients predicting the total number of force incidents during 5 y, with SDO-D and rank as predictors and no offset, stratified by officer race**

Predictors	Other non-White		
	Black officers	officers	White officers
SDO-D	1.483 [0.909, 2.420]	1.135 [0.919, 1.403]	1.253** [1.088, 1.442]
Low vs. high rank (binary)	2.747 [0.790, 9.551]	3.642*** [2.140, 6.199]	2.190*** [1.623, 2.954]

Brackets: 95% CIs. \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

transform an officer’s legitimate order maintenance role into “authority maintenance policing.” That is, officers may conflate their authority with their need to feel respected, transforming perceived disrespect into a perceived physical threat. The public sometimes embraces officers’ asserting their authority (19). For example, higher-SDO United States residents tend to support excessive police use of force (20).

The present research takes this idea a step further. We propose that, for White officers who support social hierarchy, order-maintenance policing will become not only authority-maintenance policing, but also hierarchy-maintenance policing, with officers using physical force to maintain social hierarchy. In a hierarchy-maintenance framework, White police officers could use force to maintain racial hierarchy, authority hierarchy, or both, because they hold dominant identities in both hierarchies. With historical roots in slave patrols, American patrol policing has a deep history of maintaining social hierarchies (21). The present research investigates whether modern police violence may also function as hierarchy maintenance.

In this research, we tested whether White officers who support social hierarchy are especially likely to use force. We hypothesized high-SDO White officers would be more likely to use force than low-SDO White officers. This combination of individual orientation (SDO), group position (Whiteness), and situational ability to exert power (police officer) may present a dangerous mixture that encourages those who support social hierarchy to use force to maintain it.

**Officer Race and Rank**

Americans associate Black people with low status and White people with high status (22, 23), so a hierarchy-maintenance framework predicts an SDO/force relationship for White officers, who benefit from the existing social hierarchy. Little research examines officer–resident interactions, and existing research on same-race and cross-race policing is inconsistent.<sup>†, #</sup>

We also expected junior officers would reveal higher rates of force, as in previous research (24–26). However, senior officers also might use force more frequently per citation, as higher-ranked officers issue fewer citations and are more likely to respond to serious situations.

<sup>†</sup>Some research shows Black and Latinx officers search Black and Latinx motorists less frequently than White officers do, and are more likely to find contraband (36). Findings on racial differences are mixed (24, 25). Younger male officers use deadly force more frequently than others (24, 25).

<sup>#</sup>The current studies argue that any use of force can help to maintain hierarchy, and do not model racial disparities in officers’ use of force. However, analysts working with department-wide data (not limited to survey respondents) were able to model racial disparities in officers’ tendency to use force in two of the three cities we studied, with data limitations precluding this analysis in one city. Rounded to the nearest 0.5 for confidentiality, in one city, Black residents were six times more likely than White residents to experience use of force, controlling for neighborhood-level poverty and racial demographics. In the other city, Black residents were 5.5 times more likely than White residents to experience use of force, controlling for neighborhood-level poverty, racial demographics, and crime.

**Results**

**Study 1.**

**Social dominance.** As predicted, a negative binomial regression model, stratified by race with SDO<sub>75</sub> and officer rank as predictors and citations as an offset, indicates that for White officers, SDO is positively associated with force incidents per citation (Table 1). For Black officers, SDO is negatively associated with the rate of force. For Other non-White officers, the association between SDO and the rate of force was not significant. Notably, the Black and Other non-White groups were small.

To understand possible effects of outliers, we also winsorized officers’ total force incidents that exceeded 3 SDs above the mean. This reduced total force incidents for one high-rank Black officer, one high-rank Other non-White officer, and two low-rank White officers. Effects of SDO remained significant for Black officers and White officers, and the effect of rank for White officers also remained significant (*SI Appendix, Table S7*).

The negative SDO/force association for Black officers was unpredicted, and merits further research. We speculate three possible reasons for this relationship. First, SDO may operate differently for low-status group members than high-status group members, with high-SDO Black officers, for example, not seeing themselves as hierarchy enhancers. Second, the context of this city may shape relationships between officers and communities. For example, study 1 participants are officers in a majority non-White city, a social context that could shape officer–resident interactions. Finally, this pattern may not extend to larger samples of Black officers.

**Rank.** Higher-ranked White officers use significantly more force per citation than lower-ranked White officers (Table 1). This finding contrasts with previous literature (24–26). For Black officers and Other non-White officers, the association between rank and force was not significant. Of note, few officers ranked above patrol. The higher rate of force for higher- versus lower-ranked White officers may have two factors: first, higher-ranked officers have additional responsibilities and issue fewer citations; second, situations to which higher-ranked officers are called may be more serious, involving more force.

**Racial prejudice.** An alternative or additional explanation for SDO effects may be that racial prejudice drives use of force. However, racial bias does not account for the effects of SDO in this sample, as shown in a separate, secondary analysis. Symbolic racism does not significantly predict use of force when added as an additional predictor (Black officers:  $B = 0.23$ ;  $SE = 0.23$ ;  $P = 0.32$ ; White officers:  $B = -0.27$ ;  $SE = 0.21$ ;  $P = 0.20$ ; Other non-White:  $B = -0.04$ ;  $SE = 0.30$ ;  $P = 0.89$ ).<sup>‡</sup>

Adding the feeling thermometer to the SDO/force regression does show explicit warmth toward Black people as a significant predictor of force for Black officers ( $B = 0.03$ ;  $SE = 0.01$ ;  $P < 0.001$ ) and White officers ( $B = 0.02$ ;  $SE = 0.01$ ;  $P = 0.02$ ), with higher levels of warmth predicting higher rates of force, but not for Other non-White officers ( $B = 0.01$ ;  $SE = 0.01$ ;  $P = 0.26$ ).<sup>\*\*</sup> Main effects of SDO for Black officers and White officers remain significant (for Black officers:  $B = -0.52$ ;  $SE = 0.27$ ;  $P = 0.05$ ; for White officers:  $B = 0.74$ ;  $SE = 0.19$ ;  $P < 0.001$ ). Though we did not make predictions about effects of prejudice, speculatively, these effects are consistent with contact hypothesis literature (27). As contact increases, prejudice decreases. However, with increased contact, police would also accrue more opportunities to use force. To follow up on this speculation, because survey data were collected after use-of-force behavior was observed, continued behavioral data collection would be

<sup>‡</sup>In the study 1 sample, symbolic racism correlates positively with SDO ( $r = 0.32$ ;  $P < 0.001$ ).

<sup>\*\*</sup>Explicit warmth toward Black people correlates negatively with SDO ( $r = -0.25$ ;  $P = 0.02$ ). The relationships between warmth toward Black people, SDO, and force could suggest a suppressor effect. See *SI Appendix, Tables S11–S19* for correlations.

**Table 3. Study 3: Exponentiated negative binomial regression coefficients predicting the rate of force incidents per stop, with SDO-D as predictor and stops as an offset, stratified by officer race, for patrol (low-rank) officers**

Predictors	Black officers	Other non-White officers	White officers
SDO-D	0.32 [0.08, 1.36]	0.45** [0.26, 0.80]	1.29* [1.00, 1.66]

Brackets: 95% CIs. \*\* $P < 0.01$ ; \* $P = 0.053$ .

necessary to understand whether force might decrease along with prejudice, over time.

Adding each Black stereotype Implicit Association Test (IAT) D-score (dangerous, hostile, criminal) as predictors shows implicit Black-hostile bias is negatively related to the force rate for White officers ( $B = -1.51$ ;  $SE = 0.49$ ;  $P = 0.002$ ), suggesting stronger Black-hostile bias corresponds to less force, and not reducing the role of SDO to nonsignificance ( $B = 0.79$ ;  $SE = 0.22$ ;  $P < 0.001$ ). Implicit Black-dangerous bias is negatively related to the force rate for Black officers ( $B = -1.65$ ;  $SE = 0.82$ ;  $P = 0.04$ ), and reduces the role of SDO to marginal significance ( $B = -0.55$ ;  $SE = 0.31$ ;  $P = 0.08$ ). Speculatively, again, contact could relate to these relationships. However, lower IAT completions (110 total) reduce statistical power in this analysis. In short, neither explicit nor implicit racial bias measures reduced the effects of SDO to nonsignificance.

**Magnitude of associations.** For patrol-level officers, we estimated the predicted increase in the rate of force of increasing one point on the seven-point SDO scale within officer race. For Black patrol officers, increasing one point on the SDO scale is associated with 5.1 fewer uses of force per 1,000 citations. For White patrol officers, increasing one SDO point is associated with 4.4 more uses of force per 1,000 citations. For Other non-White patrol officers, increasing one SDO point is nonsignificantly associated with 0.8 more uses of force per 1,000 citations. Descriptive statistics appear in *Materials and Methods* for each study.

### Study 2.

**Social dominance.** A negative binomial regression, stratified by race with SDO-D and rank as predictors and no offset, indicates SDO-D and officer rank are positively associated with total force incidents for White officers (Table 2). For Black officers and Other non-White officers (smaller groups), SDO-D does not significantly relate to force incidents.

A significant main effect of rank is shown for White officers and Other non-White officers (Table 2). For both groups, lower-ranked officers used force in more incidents. For Black officers, the rank-force association is not significant.

Again, we winsorized officers' total force incidents exceeding 3 SDs above the mean. This reduced total force incidents for three low-rank, Other non-White officers, and five low-rank White officers. The effect of SDO remains significant for White officers, and the effects of rank for White officers and Other non-White officers also remain significant (*SI Appendix, Table S8*).

Study 2's findings are closer to our prediction that Black officers would show a weak or nonsignificant relationship between SDO and force. These results replicate findings from White officers in study 1, and suggest that study 1's negative relationship between SDO and force for Black officers may not generalize.

**Racial prejudice.** As in study 1, in a secondary analysis, we tested roles of explicit and implicit anti-Black bias by separately adding a feeling thermometer and Black-hostile IAT measure to the regressions.<sup>††</sup>

Adding the feeling thermometer shows explicit warmth toward Black community members as a positive, significant predictor of

force incidents for Black officers ( $B = 0.058$ ;  $SE = 0.0148$ ;  $P < 0.001$ ). The feeling thermometer does not significantly predict force for White officers ( $B = 0.007$ ;  $SE = 0.005$ ;  $P = 0.123$ ) or other non-White officers ( $B = -0.005$ ;  $SE = 0.006$ ;  $P = 0.196$ ). SDO-D remains a significant predictor for White officers:  $B = 0.262$ ;  $SE = 0.075$ ;  $P = 0.001$ .

Adding the IAT D-score shows implicit Black-hostile bias is positively related to the force rate for White officers, the opposite of the Black-hostile IAT effect found in study 1 ( $B = 0.522$ ;  $SE = 0.228$ ;  $P = 0.02$ ). SDO-D remains a significant predictor ( $B = 0.160$ ;  $SE = 0.073$ ;  $P = 0.03$ ). IAT scores do not significantly predict force for Black officers ( $B = 3.80$ ;  $SE = 2.77$ ;  $P = 0.170$ ) or other non-White officers ( $B = 0.164$ ;  $SE = 0.381$ ;  $P = 0.67$ ). Again, lower IAT completions (251) reduce statistical power in these analyses.

**Magnitude of associations.** For White patrol officers, increasing one point on the SDO-D scale is associated with 3.92 more uses of force over 5 y. That increase is nonsignificantly associated with 3.41 more uses of force for Black patrol officers, and nonsignificantly associated with 2.45 more uses of force for Other non-White officers.<sup>‡‡</sup>

### Study 3.

**Social dominance.** Our planned data analysis was the same as in studies 1 and 2, to conduct a negative binomial regression predicting use of force incidents with all stops (plus one, natural log-transformed) as an offset, and SDO-D and rank as predictors, stratified by officers' racial identity. These analyses did not show a significant SDO/force relationship for White officers. We also conducted exploratory analyses of SDO/force relationships, with stops as an offset, stratified by both officers' racial identity and rank, reported here. We stratify by rank to focus on SDO/force relationships in patrol officers, because patrol- and higher-ranked officers have different responsibilities and different interactions with residents. This may be one reason we found different relationships between rank and use of force between studies 1 and 2.

Negative binomial regression models (Tables 3 and 4) test relationships between SDO-D and force, in stratified models for patrol and higher-ranked officers by race, with SDO-D as predictor and stops as an offset. For White patrol officers, SDO-D is marginally, positively associated with force rates. For Other non-White patrol officers, SDO-D is negatively related to force rates. For Black patrol officers, SDO-D is not significantly related to force rates.

For higher-ranked officers in all race groups, there is no significant relationship between SDO-D and force rates (although these groups are all small). Because these exploratory regression models are stratified by patrol versus higher rank, we did not test for effects of officer rank.

We again winsorized officers' total force incidents exceeding 3 SDs above the mean. This reduced total force incidents for one high-rank, Other non-White officer, and four high-rank White officers. The effects of SDO-D did not change for any group of patrol-level officers (*SI Appendix, Tables S9 and S10*).

**Racial prejudice.** As in studies 1 and 2, we added a feeling thermometer and Black-hostile IAT in separate, secondary analyses in study 3.<sup>§§</sup>

Adding the feeling thermometer shows explicit warmth toward Black community members as a significant negative predictor of force for Black patrol officers ( $B = -0.042$ ;  $SE = 0.0164$ ;  $P = 0.01$ ). The

<sup>††</sup>In study 2, warmth toward Black people correlates negatively with SDO ( $r = -0.16$ ;  $P = 0.006$ ). Black-hostile IAT scores correlate positively with SDO ( $r = 0.13$ ;  $P = 0.04$ ).

<sup>‡‡</sup>Magnitudes of associations are not necessarily similar across cities. Differences may be attributable to different behavior (e.g., more frequent use of force in study 2) and/or data limitations (e.g., limited stops data in study 2), both of which may relate to department culture (37).

<sup>§§</sup>In study 3, warmth toward Black people correlates negatively with SDO ( $r = -0.24$ ;  $P < 0.001$ ).

**Table 4. Study 3: Exponentiated negative binomial regression coefficients predicting the rate of force incidents per stop, with SDO-D as predictor and stops as an offset, stratified by officer race, for high-rank officers**

Predictors	Black officers	Other non-White officers	White officers
SDO-D	1.23 [0.57, 2.67]	0.67 [0.23, 1.92]	0.95 [0.76, 1.20]

Brackets: 95% CIs.

feeling thermometer does not significantly predict force for White patrol officers ( $B = 0.006$ ;  $SE = 0.0058$ ;  $P = 0.267$ ) or Other non-White officers ( $B = -0.010$ ;  $SE = 0.0176$ ;  $P = 0.587$ ). The positive relationship between SDO-D and force for White patrol officers ( $B = 0.335$ ;  $SE = 0.132$ ;  $P = 0.011$ ), and the negative relationship between SDO-D and force for Other non-White patrol officers ( $B = -0.755$ ;  $SE = 0.298$ ;  $P = 0.011$ ), both remain significant.

Adding the IAT D-score does not show implicit Black-hostile bias as a significant predictor of force rates for any subgroup of patrol officers (Black patrol officers:  $B = -0.018$ ;  $SE = 1.235$ ;  $P = 0.988$ ; Other non-White patrol officers:  $B = -1.138$ ;  $SE = 2.079$ ;  $P = 0.584$ ; White patrol officers:  $B = -0.304$ ;  $SE = 0.286$ ;  $P = 0.289$ ). Again, lower IAT completions (202) reduce statistical power.

**Magnitude of associations.** For White patrol officers, increasing one SDO-D point is associated with 42.4 more uses of force per 1,000 stops. For Black patrol officers, increasing one point on the SDO-D scale is nonsignificantly associated with 181.1 fewer uses of force per 1,000 stops. For Other non-White patrol officers, increasing one SDO-D point is nonsignificantly associated with 125.0 fewer uses of force per 1,000 stops.

**Combined Sample of Three Cities.** Because the relationships between SDO and force for Black officers vary in studies 1 to 3, because the numbers of Black officers in each study are relatively small, and to test robustness for the positive SDO/force relationship for White patrol officers across cities, we conducted additional analyses that include data from patrol-level officers in all three cities ( $n = 448$ ).<sup>¶¶</sup>

For these combined analyses, we used the four SDO items in common across all three individual studies, which comprise the Short SDO-D scale. We also included city as a predictor, to help account for differences between cities. To investigate robustness, we conducted these analyses both with and without an offset for stops/citations (Tables 5 and 6), and also with racial prejudice measures as predictors (see *Racial prejudice* sections). Because the hypothesized relationships are most relevant to officers who routinely conduct patrol activities, we conducted these analyses on patrol-rank officers only.

In all combined analyses, we observed significant, positive relationships between SDO and force for White patrol officers, and nonsignificant (or marginally significant) relationships between SDO and force for non-White patrol officers. As noted previously, additional research must continue to investigate potential SDO/force relationships in larger samples of non-White officers.

**Three Cities: Patrol Officers, With Offset.** Negative binomial regression analysis with Short SDO-D as predictor and citations or stops as an offset, stratified by officer race, shows a significant positive relationship between SDO and force per citation or stop for White patrol officers, a nonsignificant negative relationship between SDO and force per citation or stop for Black patrol

<sup>¶¶</sup>In addition to the main stratified analysis, in this combined sample, we also conducted an exploratory test of whether SDO/force relationships differ by officer race (SI Appendix, Table S5). This nonstratified analysis is not ideal because it risks confounding by race due to unequal group sizes, and because of low statistical power for non-White groups. However, significant interaction effects provide some initial evidence that the relationship between SDO and force may differ by officer race.

**Table 5. Combined sample: Exponentiated negative binomial regression coefficients predicting the rate of force incidents per citation or stop for patrol officers, with Short SDO-D as predictor and citations or stops as an offset, stratified by officer race**

Predictors	Black officers	Other non-White officers	White officers
Short SDO-D	0.99 [0.69, 1.41]	0.82 <sup>+</sup> [0.66, 1.02]	1.79*** [1.56, 2.06]

Brackets: 95% CIs. \*\*\* $P < 0.001$ ; <sup>+</sup> $P = 0.069$ .

officers, and a marginally significant negative relationship between SDO and force per citation or stop for Other non-White patrol officers (Fig. 1 and Table 5). Of note, the stops offset included for study 2 in this combined analysis contained low numbers of stops, as described elsewhere. Despite the low levels of reported stops, we did include it in this combined analysis. This analysis controls for city, with study 1 as the reference group. Although we did not make predictions about the SDO/force relationship for the Other non-White group, the marginal negative relationship between SDO and force for Other non-White officers is surprising. Future research must continue to investigate this possible relationship in additional cities and larger samples.

**Racial prejudice.** As in studies 1, 2, and 3, we added a feeling thermometer and Black-hostile IAT to this combined sample analysis. With prejudice measures included, the positive relationship between SDO and force remains significant for White patrol officers ( $B = 0.44$ ;  $SE = 0.09$ ;  $P < 0.001$ ), and SDO/force relationships remain nonsignificant for Black and other non-White patrol officers.

Explicit warmth toward Black community members is a significant positive predictor of force rates for White patrol officers ( $B = 0.02$ ;  $SE = 0.004$ ;  $P < 0.001$ ) and Black patrol officers ( $B = 0.05$ ;  $SE = 0.01$ ;  $P < 0.001$ ), and a significant negative predictor of force rates for other non-White patrol officers ( $B = -0.02$ ;  $SE = 0.01$ ;  $P < 0.001$ ).

Higher Black-hostile IAT scores predict lower force rates for White patrol officers ( $B = -0.50$ ;  $SE = 0.23$ ;  $P = 0.03$ ). IAT scores are not significantly related to force rates for Black or other non-White patrol officers.

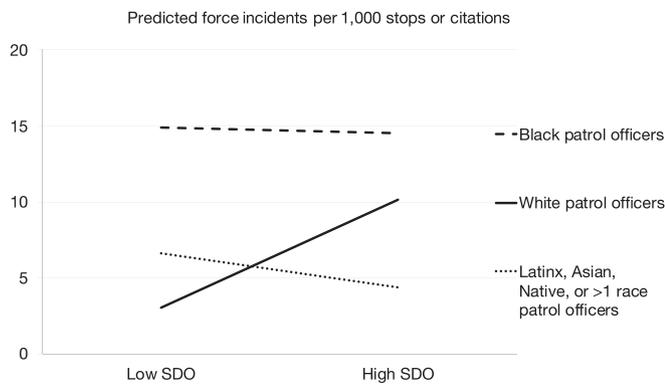
Again, we did not make predictions about effects of explicit and implicit anti-Black prejudice, but the effects of SDO in White officers remain significant with these variables included. In addition, these effects may inform future research on how prejudice may relate to officers' tendency to use force.

**Magnitude of associations.** For White patrol officers, increasing one point on the Short SDO-D scale is associated with 4.7 more uses of force per 1,000 citations or stops. For Black patrol officers, increasing one Short SDO-D point is nonsignificantly associated with 0.2 fewer uses of force per 1,000 citation or stops. For Other non-White patrol officers, increasing one Short SDO-D point is associated with 1.0 fewer uses of force per thousand citations or stops (marginally significant).

**Table 6. Combined sample: Exponentiated negative binomial regression coefficients predicting the total number of force incidents for patrol officers, with Short SDO-D as predictor and no offset, stratified by officer race**

Predictors	Black officers	Other non-White officers	White officers
Short SDO-D	1.00 [0.75, 1.32]	1.15 [0.95, 1.40]	1.24** [1.10, 1.40]

Brackets: 95% CIs. \*\* $P < 0.01$ .



**Fig. 1.** Combined sample of patrol officers, stratified by race, predicted force incidents per 1,000 citations or stops: Effects of SDO (grand mean  $-1$  SD to grand mean  $+1$  SD).

**Three Cities: Patrol Officers, No Offset.** With no offset, exploratory negative binomial regression analysis of patrol-level officers across samples with Short SDO-D as predictor and no offset, stratified by officer race, shows a significant positive relationship between SDO and force for White patrol officers (Table 6), a nonsignificant negative relationship between SDO and force for Black patrol officers, and a nonsignificant positive relationship between SDO and force for Other non-White patrol officers. This analysis controls for city, with study 1 as the reference group.

**Racial prejudice.** With the feeling thermometer and Black-hostile IAT included, the positive relationship between SDO and force remains significant for White patrol officers ( $B = 0.27$ ;  $SE = 0.07$ ;  $P < 0.001$ ), and SDO-force relationships remain nonsignificant for both non-White groups.

Explicit warmth toward Black community members is a significant positive predictor of force for Black patrol officers ( $B = 0.04$ ;  $SE = 0.01$ ;  $P < 0.001$ ), a marginally significant negative predictor of force for other non-White patrol officers ( $B = -0.01$ ;  $SE = 0.006$ ;  $P = 0.05$ ), and does not significantly predict force for White patrol officers.

Black-hostile IAT scores do not significantly relate to force for any group of patrol officers in this model.

**Magnitude of associations.** For White patrol officers, increasing one point on the Short SDO-D scale is associated with 13.8 more uses of force. For Black patrol officers, increasing one Short SDO-D point is nonsignificantly associated with 0.1 fewer uses of force. For Other non-White patrol officers, increasing one Short SDO-D point is nonsignificantly associated with 17.4 more uses of force.

## Discussion

Using three samples of active-duty police officers, this research provides direct evidence that psychological factors relate to police officers' actual use of force. We observed relationships between SDO and force in three different cities, with different rates of force. Specifically, White patrol officers showed positive SDO/force

relationships (studies 1 and 2; marginal in study 3; combined sample), and Black patrol officers showed negative (study 1) or non-significant (studies 2 and 3; combined sample) SDO/force relationships. Different from previous research, in study 1, high-ranked White officers used more force per citation than White patrol officers. In study 2, patrol officers used force more frequently than did high-ranked officers, at least for White officers and Other non-White officers. Analyzing a combined sample across cities, we observe a positive SDO/force relationship for White patrol officers, and marginal or nonsignificant SDO/force relationships for Black patrol officers and Other non-White patrol officers.

These results suggest psychological approaches to understanding police force can yield valuable insights. However, our work suffers significant limitations. First, reflecting police demographics nationwide, most officers in the present studies were White, and future research must continue to investigate potential effects among non-White officers. Second, our data do not permit causal inference because surveys were collected after force incidents occurred, and because of the correlational design. It remains possible that using more force could cause officers to support hierarchies more strongly, or that patrolling a higher-crime neighborhood could cause both higher SDO and more use of force, or that higher SDO might lead officers to choose higher-crime neighborhoods and also to use more force. In other words, SDO may not cause White officers to use force more frequently, and variation in officers' SDO may also relate to features of officers' patrol environments. Until more research investigates these possibilities, correlational evidence does provide a stepping stone to future research that may help scientists and practitioners understand what to expect when high-SDO White officers interact with residents. Future research must assess these relationships longitudinally and with tighter control over situational variation. Third, though an offset solves methodological challenges of comparing officers, more analyses must employ this technique before the field can understand how it relates to raw counts. The offsets in the current studies are also imperfect, in part because of slight differences between studies: for example, differences between counting stops versus citations. Controlling for cross-study variation helps, but does not solve completely the challenge of different and imperfect administrative data collection. Fourth, because all officers were invited, and only some responded, it is possible that respondents could differ systematically from nonrespondents. We estimate completion rates ranging from 39 to 51% in these studies (see "Participants and procedure" subsections under *Materials and Methods* for details). The consistency of SDO/force relationships for White officers in three cities is a first step, and future studies may gather additional data, ideally by randomly selecting respondents.

Finally, while relationships between SDO and force are robust to other psychological measures of prejudice, possible relationships between racial prejudice and force deserve further attention: for example, relationships between prejudice and racial disparities in officers' use of force.

**Table 7. Study 1: Descriptive values for SDO<sub>75</sub>, force incidents, citations, and force incidents per 1,000 citations**

Race group	Rank	<i>n</i>	SDO <sub>75</sub> mean (SD)	Force incidents median (IQR)	Citations median (IQR)	Force incidents per 1,000 citations median (IQR)
Black	Patrol	34	2.70 (0.95)	1.00 (3.00)	244.00 (421.50)	2.18 (6.96)
	Higher	8	2.36 (0.70)	1.00 (1.75)	97.50 (269.75)	8.39 (28.97)
Other non-White	Patrol	28	2.87 (0.87)	1.00 (2.00)	368.50 (554.75)	3.01 (8.48)
	Higher	3	4.00 (0.13)	5.00 (n/a)	440.00 (n/a)	2.50 (n/a)
White	Patrol	71	3.01 (0.86)	1.00 (1.00)	312.00 (422.00)	0.71 (5.59)
	Higher	15	3.25 (1.31)	2.00 (2.00)	28.00 (136.00)	6.41 (68.97)
Overall		159	2.93 (0.94)	1.00 (2.00)	281.00 (452.00)	1.77 (8.83)

Mean and SD for normally distributed variables; median and interquartile range (IQR) for nonnormally distributed variables.

**Table 8. Study 2: Descriptive values for SDO-D, force incidents, stops, and force incidents per 1,000 stops**

Race group	Rank	<i>n</i>	SDO-D mean (SD)	Force incidents median (IQR)	Stops median (IQR)	Force incidents per 1,000 stops median (IQR)
Black	Patrol	17	2.25 (0.97)	1.00 (15.50)	20.00 (47.00)	1.20 (1178.57)
	Higher	7	1.70 (1.01)	0.00 (0.00)	0.00 (5.00)	0.00 (0.00)
Other non-White	Patrol	53	2.90 (1.08)	2.00 (26.00)	15.00 (60.00)	45.45 (1006.19)
	Higher	24	2.47 (1.14)	0.00 (4.00)	1.50 (19.00)	0.00 (109.00)
White	Patrol	110	2.96 (1.11)	4.50 (16.50)	25.00 (86.25)	60.66 (679.35)
	Higher	84	2.87 (1.21)	0.00 (4.00)	1.00 (25.00)	0.00 (416.67)
Overall		295	2.81 (1.15)	1.00 (13.00)	10.00 (53.00)	21.62 (583.33)

Mean and SD for normally distributed variables; median and IQR for nonnormally distributed variables.

**Conclusion**

The effects of SDO for White patrol officers suggest social dominance, paired with high racial status in the context of policing, may present a situational vulnerability to using force. This further suggests that situational interventions may reduce the prevalence of police force by alleviating a perceived need for hierarchy maintenance. For example, framing police responsibilities in terms of protecting vulnerable communities, as opposed to maintaining order—or hierarchy—may reduce reliance on force for high-SDO White officers. Regardless, with this demonstration of how psychological variables are associated with police force in the field, it appears scientists concerned with the equitable application of police force must take seriously the role that psychological factors play in regulating it, outside of both the laboratory and the domain of split-second decisions.

**Materials and Methods**

**Study 1.**

**Participants and procedure.** All studies were approved by institutional review boards of the University of California, Los Angeles and John Jay College. Researchers informed officers about the online survey during mandatory roll call meetings. Survey responses were collected from as many officers as were willing to participate; 343 officers began by reading an informed consent form. Of them, 167 completed less than 90% of items. Of the 176 remaining officers, 15 indicated the same officers took the survey twice, and only their first response was retained, resulting in a sample of 161 officers. Assuming a similar duplicate attempt rate, we estimate 314 unique officers began this survey, of the total 343 records of initiated surveys. This reveals a completion rate of roughly 51%. Although the data collection agreement prevents specific reporting of representativeness of the larger department for confidentiality, 106 local law enforcement agencies in the United States had more than 500 officers as of 2013 (28). With roughly half of sworn personnel tasked with patrol, this sample would represent 34% of patrol officers from the median department of more than 500 officers.

In this sample of 161 sworn police officers, 1 was removed due to missing citations records and another was removed for not completing the SDO scale, resulting in a final sample of 159. Participants averaged 35 y old, and 9 y of experience in their department; 141 men and 16 women participated and 2 did not report gender. Participants racially identified as: 86 White, 42 Black, and 31 in a composite group including Latinx, Asian, Native, or more than one race (“Other non-White”).

Participants completed survey measures including SDO (SDO<sub>75</sub>; 8 items;  $\alpha = 0.74$ ; 1 = strongly disagree to 7 = strongly agree; e.g., “Some groups of people are simply inferior to other groups”) (10), explicit and implicit measures of anti-Black prejudice (symbolic racism; 8 items;  $\alpha = 0.81$ ; 1 = strongly disagree to 7 = strongly agree; e.g., “I feel that black leaders have been trying to push too fast”) (29), a feeling thermometer, and a short version of the Black/White Dangerousness IAT, Hostility IAT, and Crime IAT (30) (*SI Appendix*); and demographic questions.

All participants consented to allow linking their survey responses with their behavioral history from department records. Participants’ records included incident-level data on citations and force over 5 y. Force incidents included every incident in which an officer used their body or a weapon while interacting with a resident. Descriptive statistics appear in Table 7. Overall median force incidents for all race groups was 1.0, and force per 1,000 citations was also similar across groups.

**Methodological challenges: Comparing officers.** One challenge to studying policing is how to compare the frequency of officers’ behavior. A raw count comparison fails to capture differences in individual opportunities to use force. By including officers’ citations as an offset, we offer a methodological solution to the challenge of comparing officers. However, officers may use force outside of issuing a citation, and higher-ranked officers issue fewer citations than do patrol officers. We address this limitation by including officers’ departmental rank in the analysis. Another way is to test the hypothesized effects among only patrol-level officers, whose activities are most relevant; we turn to this approach in study 3. Despite these caveats, an offset for citations is an improvement over previous methods that provided no proxy for exposure to residents. Ideally, it would also be possible to incorporate more information about the context of an officer’s patrol district: for example, controlling for neighborhood crime statistics. The present research is limited in this way: Neighborhood assignment is only available for one city, in which the number of districts is large relative to the number of total officers. Future research with larger datasets and more information about officers’ patrol assignments should aim to incorporate additional contextual information.

**Data analysis.** Officers use force rarely: in 1 to 2% of interactions (9). To model count data of infrequent events, we used negative binomial regression. Because the predicted SDO effect is specific to White officers’ dominant racial group identity, and because racial groups had considerably different sample sizes, our main analyses stratified by officer race. We include an offset for officers’ total number of citations, plus one, natural log-transformed.

We hypothesized that for White officers, SDO would positively relate to an officer’s number of force incidents, offset by that officer’s citations. For Black officers, we predicted a weak or nonevident SDO/force relationship.

**Table 9. Study 3: Descriptive values for SDO-D, force incidents, stops, and force incidents per 1,000 stops**

Race group	Rank	<i>n</i>	SDO-D mean (SD)	Force incidents median (IQR)	Stops median (IQR)	Force incidents per 1,000 stops median (IQR)
Black	Patrol	12	1.96 (0.76)	2.00 (2.75)	12.50 (130.75)	87.56 (259.72)
	Higher	11	2.34 (1.01)	2.00 (4.00)	4.00 (15.00)	181.82 (400.00)
Other non-White	Patrol	10	3.14 (0.99)	8.50 (13.00)	57.00 (122.75)	97.44 (304.67)
	Higher	11	3.17 (0.85)	3.00 (27.00)	80.00 (186.00)	146.60 (189.76)
White	Patrol	111	2.96 (0.97)	3.00 (7.00)	37.00 (122.00)	72.58 (234.62)
	Higher	85	2.56 (1.07)	6.00 (21.50)	56.00 (125.50)	139.53 (221.39)
Overall		240	2.76 (1.03)	4.00 (10.00)	40.50 (119.25)	111.89 (238.91)

Mean and SD for normally distributed variables; median and IQR for nonnormally distributed variables.

For Other non-White officers, we did not hold predictions about SDO and force.

**Study 2.** We preregistered a second study, in a southern United States city (31). The method was identical to study 1, with two exceptions. First, we believed the department in study 2 collected records for not only citations, but all stops. Because we expected to receive administrative data describing all stops, we preregistered our analysis with stops as the offset. However, upon receiving the data, recorded stops appeared too low to be considered a reasonable proxy for interactions with residents (Table 8). We have learned this department does not strictly regulate stop data collection. As a result, we conducted the negative binomial regression analysis in study 2 with no statistical offset, a limitation we deal with in subsequent combined analyses. Additionally, study 2 results with the initially intended but insufficient offset appear in the *SI Appendix, Table S6*.

Second, in study 2, we used the eight-item SDO-D scale measuring the dominance component of SDO ( $\alpha = 0.84$ ), from the SDO<sub>7</sub> (10), rather than the eight-item SDO<sub>7S</sub> scale in study 1, which includes four items from each of the dominance and antigalitarianism components.<sup>##</sup>

Additionally, in study 2, not all participants gave permission to link their survey responses with behavioral data. Because these studies depend on this link, only officers who consented to link their administrative data were included.

**Participants and procedure.** Survey responses were collected from all officers willing to participate; 717 officers in a large southern city began by reading an informed consent form. Of them, 406 did not volunteer their administrative data to be linked with their survey responses. Of 311 remaining officers, 5 did not complete SDO measures, and 8 indicated duplicate responses, and their first response was retained, resulting in a final sample of 295 unique officers. Assuming a similar duplicate attempt rate, we estimate 697 unique officers began the survey, indicating a completion rate of roughly 42%. Participants averaged 41 y old and 14 y in their department. Participants were included in three groups: 194 White, 24 Black, and 77 Latinx, Asian, Native, or More than one race (Other non-White). Three did not indicate race; 254 men and 39 women participated. Two did not indicate gender. Stops and use of force data were observed over 5 y prior to survey data collection. Descriptive statistics appear in Table 8.

**Data analysis.** Analyses are identical to study 1, except that in study 2 we preregistered a plan to use stops (plus one, natural log-transformed) as an offset. As described previously, officers' stops appeared too low to be a reasonable proxy for officers' interactions with residents. We were therefore left with no acceptable statistical offset in study 2, and instead conducted negative binomial regression with no offset, measuring the relationship between SDO-D and total force incidents during 5 y, including officers' rank and stratifying by officer race.

<sup>##</sup>We also conducted the same analyses reported in the main text using the four SDO items in common across all three studies, and found substantively identical results (*SI Appendix, Tables S1–S4*). Finally, we created a combined sample of patrol officers from three cities, using the SDO items in common across studies, and found similar results (*Combined Sample of Three Cities*).

**Study 3.** In study 3, we sought to replicate studies 1 and 2 in an eastern United States city (32). The method is identical to studies 1 and 2, with study 3's department collecting records for use of force and pedestrian and vehicle stops. As in study 2, we use the eight-item SDO-D scale. All officers who consented to link their administrative data with their responses were included.

**Participants and procedure.** Survey responses were collected from all officers willing to participate; 616 officers in a large eastern city began by reading an informed consent form. Of them, 374 did not finish the survey and/or did not volunteer their administrative data. Of 242 remaining officers, 2 indicated duplicate responses, and their first response was retained resulting in a final sample of 240 unique officers. Assuming a similar duplicate attempt rate, we estimate 610 unique officers began the survey, indicating a completion rate of roughly 39%. These officers completed a survey including SDO-D ( $\alpha = 0.72$ ). Participants averaged 41 y old, and 14 y in their department (17 missing age responses, 22 missing responses for years). Participants were included in three groups: 196 White, 23 Black, and 21 Other non-White. Three respondents did not indicate race; 197 men and 41 women participated. One participant did not indicate gender.

The procedure in study 3 was identical to that in studies 1 and 2. Stops and use of force data were observed over 6 y. Descriptive statistics appear in Table 9.

**Data analysis.** As described in *Results*, the planned data analysis, a negative binomial regression predicting use of force incidents with all stops (plus one, natural log-transformed) as an offset, and SDO-D and rank as predictors, stratified by officers' racial identity, did not show a significant SDO/force relationship for White officers. We also conducted exploratory analyses of SDO/force relationships, with stops as an offset, stratified by both officers' racial identity and rank, reported here. In the combined sample analyses, across all three cities, we then tested SDO/force relationships on patrol officers only, focusing on the officers for whom stops and force behavior are most relevant. In the combined sample, we found SDO relates positively to force for White patrol officers.

**Data Availability.** Under agreements with the participating police departments, the researchers are unable to release police department data unless the department chooses to do so. However, we have identified a way for interested researchers to work with us to access these unique data if they would like to replicate our results. For more information, please contact the authors.

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