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Social Status and Unethical Behavior: Two Replications of the Field Studies in Piff et al. (2012)

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Prominent social psychologists and major media outlets have put forward the notion that people of high socioeconomic status (SES) are more selfish and behave more unethically than people of low SES. In contrast, other research in economics and sociology has hypothesized and found a positive relationship between SES and prosocial and ethical behavior. We review the empirical evidence for these contradictory findings and conduct two direct, well-powered, and preregistered replications of the field studies by Piff and colleagues (2012) to test the relationship between SES and unethical/selfish behavior. Unlike the original findings, we find no evidence of a positive relationship between SES and unethical/selfish behavior in the two field replication studies.

Keywords: social class, socioeconomic status, prosocial behavior, ethical behavior, replication

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Who behaves more miserly and unethically, the poor or the rich? Some psychologists argue that it is the rich, or more specifically, people of high socioeconomic status (SES). They propose that people of high SES are more independent and less socially attuned than the lower social classes (Stellar et al., 2012). As a consequence, it has been hypothesized that high-SES individuals are more likely to engage in antisocial and unethical behavior (Kraus et al., 2012; Piff et al., 2010). Consistent with this hypothesis, findings show that high-SES individuals are more selfish and less likely to give to charity and to help others (Piff et al., 2010). Studies also found that high-SES individuals are more likely to engage in unethical behavior, such as taking candies from children, lying in job negotiations, cheating, pilfering, and outright stealing (Dubois et al., 2015; Guinote et al., 2015; Piff et al., 2010, 2012).

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Notable are the two field studies conducted by Piff et al. (2012) in which drivers of high social status were found to be more likely to cut off other drivers at intersections and less likely to yield the right of way to pedestrians at crosswalks than drivers of low social status (SES was inferred from car make, age, and appearance). The popular press extensively featured the findings in Piff et al. (2012) and particularly these two field studies (e.g., BBC, 2015; Bilton, 2015; Economist, 2010; Elkins, 2015; Preston, 2013; Scutti, 2018; Sullivan, 2017; Vedantam et al., 2018; Wan, 2018; Warner, 2010; Woodruff, 2012). The Piff et al. (2012) article had over 1,200 Google Scholar citations in August 2022.

Piff et al.'s (2012) findings have stimulated many new investigations on the relationship between social status and unethical behavior and prosociality. Several articles found supporting evidence for the negative relationship between social status and prosocial behavior (e.g., Amir et al., 2018; Chen et al., 2013; Kirkpatrick et al., 2015; Miller et al., 2015). However, other articles report the opposite pattern, whereby people of higher social status behave more prosocially than those of lower social status (for example, Andreoni et al., 2021; Gittell & Tebaldi, 2006; Hoffman, 2011; Hughes & Luksetich, 2008; James & Sharpe, 2007; Korndörfer et al., 2015; Lee & Chang, 2007; Rajan et al., 2009; Ramirez-Valles, 2006; Reed & Selbee, 2001; Schmukle et al., 2019; Smeets et al., 2015; von Hermanni & Tutić, 2019). Moreover, direct replications of laboratory studies in Piff et al. (2012; Studies 5 and 7) do not find evidence for the negative relationship between social status and prosocial behavior (Balakrishnan et al., 2017a, 2017b; Clerke et al., Brown, 2018).

Given this mixed evidence on the robustness of the findings, we conducted two high-powered registered replications of the two field studies in Piff et al. (2012) under the guidance of an expert review team that included one of the authors of the original article. Our replications constitute the first registered report of direct replications of these field studies. Direct replications are necessary for researchers who want to build on original research findings (Zwaan et al., 2018), as original findings may suffer from publication bias (Greenwald, 1975; Ioannidis, 2005) and exploitation of researcher degrees of freedom (John et al., 2012; Simmons et al., 2011). Both publication bias and researcher degrees of freedom can lead to an overestimation of effect sizes and increase rates of false-positive findings. Direct, preregistered replications can effectively correct both problems (see Ioannidis, 2018 and Zwaan et al., 2018) for more on the advantages of replications, and Nosek et al. (2018) and Lakens (2019) for the usefulness of preregistrations).

No replication is an exact direct replication (Zwaan et al., 2018), especially when replicating field studies 10 years after the original studies were conducted. With the help of the review team, we made our best attempt to stay as close as possible to the original study method. Rather than limiting the applicability of the replication findings, however, research findings are most useful when their predictive power is shown beyond the narrow specificity of the original study setting.

A failure to replicate the original results does not necessarily indicate that the general claims about SES and unethical behavior made in Piff et al. (2012) are invalid.[1] But registered reports of preregistered replications offer insights regarding the robustness of the original findings, and hence contribute to generating future research with renewed perspectives on important topics.

We summarize our findings as follows. Following Simonsohn (2015), our data sets contain 2.5 times the number of observations used in the original studies. With these sample sizes, our replications had 80% power to detect a third of the original effect sizes reported in Piff et al. (2012). In both replications, we found no positive correlation between SES and unethical and selfish behavior. We discuss the implications of our findings in the conclusion.

The Existing Literature on the Relationship Between SES and Unethical/Selfish Behavior

A wide range of research in psychology, sociology, and economics has investigated the relationship between SES and unethical/selfish behavior. Social class or socioeconomic status (SES) refers to an individual's rank in society in terms of wealth, occupational prestige, and education (Adler et al., 2000; Kraus et al., 2012; Piff et al., 2012).

Violating traffic laws consists of both unethical and selfish components, two elements that might be positively correlated, but are conceptually distinct. We follow the definitions of Dubois and colleagues (2015), whereby selfishness is defined as a heightened concern with one's own profit or pleasure. In contrast, unethical behavior is defined as any action "illegal or morally unacceptable to the large community." Cutting off others constitutes selfish and unethical behavior as drivers reach their destination faster at the expense of others' time and safety. Cutting off others is also a legal offense as it constitutes a violation of traffic laws.

Studies Showing a Positive Relationship Between SES and Unethical Behavior/Selfishness

Piff et al. (2012) found a positive relationship between SES (inferred from car status) and unethical behavior. Following the publication of Piff et al. (2012), many researchers examined the relationship between SES and unethical and selfish behavior in various contexts. It should be noted, however, that direct replications of laboratory Studies 5 and 7 in Piff et al. (2012) failed to corroborate the original findings (Balakrishnan et al., 2017a, 2017b; Clerke et al., 2018). For instance, SES is positively related to self-reported greed, but in three out of four studies, no relationship between SES and unethical behavior was observed (Balakrishnan et al., 2017b). A meta-analysis of their findings shows no moderating effect of greed on the relationship between SES and unethical behavior, as hypothesized and reported by Piff et al. (2012). Clerke et al. (2018) reported a positive relationship between SES and self-reported greed in one of their two studies but found no association between SES and the propensity to lie in a hypothetical salary negotiation. Even if the original hypothesis were true, it is unlikely for all seven studies in Piff et al. (2012) to have yielded significant results, given the low power of the studies (Francis, 2012).

Using the World Values Survey across 27 countries, Wang and Murnighan (2014) found that income is positively correlated with the approval of unethical behavior. Specifically, individuals who reported belonging to a higher income decile were more likely to approve of claiming unentitled government benefits, avoid paying for public transport, to cheat on taxes, and accept a bribe than individuals from lower income deciles. Individuals with higher incomes are more likely to misreport their income in IRS data from 2001(Johns & Slemrod, 2010). Moreover, the probability of hiding assets offshore rose sharply and significantly with wealth (Alstadsæter et al., 2019). Upper SES individuals cheat more than lower SES individuals when cheating was beneficial to them (Dubois et al., 2015). But the opposite—lower SES individuals cheating more than upper SES individuals—was found when cheating benefited another person, suggesting that the relationship between SES and unethical behavior is context-dependent.

In a series of laboratory and online experiments, Piff et al. (2010) documented higher SES participants to be less likely to allocate money to others in hypothetical economic games and to be less willing to help a confederate than low-SES participants. Two recent preregistered and highly powered replications of Studies 1 and 2 in Piff et al. (2010), however, failed to corroborate these findings (Stamos et al., 2020).

There is some evidence suggesting that a positive relationship between SES and selfish behavior arises early on. For example, subtle cues to high social status (e.g., school ranking) lead both preschool children and adults to behave less kind toward those who are in need and to be less likely to endorse egalitarian life goals (e.g., helping others in need; Guinote et al., 2015). Four-year-old children from high-income families in rural areas in China are less altruistic in a dictator game with friends or strangers than those from low-income families (Chen et al., 2013). Likewise, Miller and colleagues (2015) observed a negative correlation between children's family income and the number of tokens that the children donated to other anonymous sick children. Both

[1] As commented by one reviewer, it is not clear to what extent SES correlates with the monetary value of a car. It might be that people who are more egoistic also want to show off more (i.e., buy more expensive cars). Whereas there is some evidence that SES and car value do correlate (e.g., Lansley, 2016), this correlation was not the focus of our studies.

childhood SES and current family SES are negatively correlated to participants' monetary offers in dictator games (Amir et al., 2018), and current family income is negatively correlated to fictitious monetary allocations to acquaintances, but not to friends (Kirkpatrick et al., 2015).

Several studies have identified moderators for the relationship between SES and unethical/selfish or prosocial behavior. For example, observability of prosocial decisions moderates the relationship between SES and prosocial behavior such that lower SES individuals are more prosocial in private than in public, whereas upper SES individuals show the reverse pattern (Kraus & Callaghan, 2016).

The visibility of wealth inequality has been shown to moderate the effect of wealth inequality on participants' contribution to public goods (Heap et al., 2016). Wealth inequality also moderates the effect of SES on cooperation in social networks (Nishi et al., 2015). Consistent with this argument, Côté et al. (2015) argued that a negative relationship between SES and prosocial/ethical behavior is observed only in countries where inequality is large (operationalized by a country's Gini coefficient), such as the United States, but not in European countries. However, in data sets from 30 countries (including the United States; $N = 60{,}033$), Schmukle et al. (2019) were unable to find empirical support for Côté et al.'s (2015) findings. On the contrary, these authors found a robust positive relationship between income and prosocial behavior, irrespective of economic inequality. The findings by Schmukle et al. (2019) were replicated in a different data set from the European Social Survey ($N = 20{,}715$) by Von Hermanni and Tutić (2019). More specifically, these authors found the opposite effect as reported in Côté et al. (2015), whereby SES influenced prosocial behavior more positively when economic inequality was high.

Taken together, several articles have demonstrated a positive relationship between SES and unethical behavior/selfishness. The findings, however, vary greatly across contexts and are in some cases inconsistent. This suggests that the relationship between SES and unethical/selfish behavior is multiply determined, and that the context in which social status operates plays an important role. Several conceptual replications failed to find support for the hypothesized relationship, and in some cases, even showed the opposite relationship, whereby higher SES was negatively related to selfish behavior.

Studies Showing a Negative Relationship Between SES and Unethical Behavior/Selfishness

Contrary to the body of research that demonstrates a positive relationship between SES and selfish/unethical behavior, there is a substantial amount of research in economics and sociology documents a negative relationship between SES and selfishness or unethicality.

During the Holocaust in the Second World War, for example, the wealthy were more likely to rescue Jews than the less wealthy, even after controlling for the number of rooms in their house (Hoffman, 2011). Individuals living in affluent areas were found to be more likely to send back wrongly addressed letters containing cash than individuals living in poorer areas (Andreoni et al., 2021).

Korndörfer et al. (2015) conducted one of the most comprehensive studies testing the link between SES and selfishness/prosocial behavior with the German Socio-Economic Panel (SOEP), the American General Social Survey (GSS), the American Consumer Expenditure Survey (CEX), and the International Social Survey Program (ISSP). Across 30 countries, high-SES individuals were found to be more likely to make charitable donations and to contribute a higher percentage of their family income to charity, be more helpful and likely to volunteer, and be more trustworthy in an economic game when interacting with a stranger than low-SES individuals.

Other studies using general population samples came to similar conclusions. In the American General Social Survey (GSS), high-SES individuals were found to be more trustworthy than low-SES individuals (Alesina & La Ferrara, 2002). In the Consumer Expenditure Survey, high social class Americans were more likely to make any kind of charitable donation (James & Sharpe, 2007) than low social class Americans. Internal Revenue Service (IRS) data in the United States showed that high-SES individuals give more time and money to charity (Gittell & Tebaldi, 2006; for similar findings see Hughes & Luksetich, 2008; Ramirez-Valles, 2006; and the report from the Bureau of Labor Statistics, 2016). Similarly, high-SES Canadians are reported to be more likely to donate time and money to charity compared to low-SES Canadians (Reed & Selbee, 2001; Rajan et al., 2009). A similar pattern has been observed in Taiwan (Lee & Chang, 2007). Finally, Kuehn and Vosgerau (2022) asked ex-offenders on parole and people without a criminal record to play the deception game, in which participants can deceive their counterparts to increase their own monetary payoff at the expense of their counterpart's payoff (Gneezy, 2005). The results showed that a participant's likelihood of deceiving their counterpart was predicted not by their criminal record but rather by their income: participants with higher incomes were less likely to deceive and harm their counterpart for their own gain.

A positive relationship between SES and prosocial behavior has also been observed for very wealthy individuals who are typically not present in general population samples. Millionaires gave more to low-income individuals in a dictator game than the general population does (Smeets et al., 2015). Millionaires were also found to volunteer more than the general population, even though working millionaires reported having less leisure time than others (Smeets et al., 2020).

A couple of studies suggest a U-shaped curve for the relationship between income and prosocial behavior such as giving and volunteering (cf., James & Sharpe, 2007; Liddell & Wilson, 2013). According to these studies, individuals with low or high incomes are more prosocial than individuals with middle incomes. However, low-SES households are less likely to make any donation at all (James & Sharpe, 2007). When including both donors and nondonors, U-curved patterns are likely to transform into linearly increasing trends indicating that higher social class households donate a greater percentage of their income to charity (Korndörfer et al., 2015; Schervish & Havens, 1995a, 1995b).

What Could Explain the Differences Between Studies Showing a Positive Versus Negative Relationship Between SES and Unethical/Selfish Behavior?

Why does one set of findings show that high-SES individuals are more likely to engage in unethical/selfish behaviors, and another set of findings shows the opposite? From an economic point of view, prosocial behavior-such as caring about others' well-being and valuing ethical principles-implicates substantial opportunity costs. Only those with sufficient resources can afford to bear these costs (Trautmann et al., 2013). In this light, social preferences are "luxury" preferences that only the affluent can afford to entertain. High-SES individuals can afford to donate more because their salary is not completely absorbed by covering necessities, and they are more likely to outsource activities they dislike and engage in activities that they do like (Smeets et al., 2020; Whillans et al., 2017). It is easier to volunteer if one has flexible working hours, enough money, and a kindergarten place for the children (even better, a nanny).

Several studies lend support to the role of opportunity costs on prosocial decisions and behaviors. Blanco and Dalton (2019) asked individuals from different socioeconomic strata in Bogota, Colombia, to play dictator games. Individuals from richer strata gave more in the games than individuals from poorer strata. Yet, when accounting for the daily expenditures of individuals, the fraction of money given was equal across strata. Similarly, in the natural field experiment mentioned above (Andreoni et al., 2021) in which envelopes containing cash were "misdelivered" to rich and poor households in a Dutch city, rich individuals were more likely to return these envelopes than poor individuals. However, when envelopes were "misdelivered" in weeks when the poor received their paychecks, the gap in return rates reduced significantly. Finally, Trautmann et al. (2013) used data from a large Dutch population sample and showed that high-SES individuals were more likely to volunteer, but also more likely to cheat on their taxes than low-SES individuals, lending further support to the role of opportunity costs.

Together, these studies suggest that opportunity costs rather than SES determine whether people behave prosocially/ethically or not. The primary distinction between rich and poor individuals may simply be that the affluent have more money (Andreoni et al., 2021). Whether or not high- or low-SES individuals behave more prosocially might also depend on subjective perceptions of opportunity costs, perceptions that—to our knowledge—have not been investigated so far.

The Original Field Studies in Piff et al. (2012) and Extant Replication Attempts

Piff et al. (2012) reported a positive relationship between SES and unethical behavior in two field studies conducted in Berkeley, California. We will refer to these two field studies as OS1 and OS2, and our replications as RS1 and RS2. Both RS1 and RS2 were direct replications of the original studies OS1 and OS2, which were run in the Bay Area in Northern California. In OS1, researchers recorded the likelihood of drivers to cut off other drivers at a busy four-way intersection in Berkeley, and rated the cars' current value (vehicle status) on the following 5-point scale: 1 = *cars worth \$3,000 or less*; 2 = *\$3,001–10,000*; 3 = *\$10,001–25,000*; 4 = *\$25,001–40,000*; 5 = *cars worth more than \$40,000*.[2] Piff et al. (2012) found a positive correlation of $r = .12$, $p = .047$, between rated vehicle status and the likelihood of cutting off others ($N = 274$; controlling for time of day, driver's rated sex and age, and amount of traffic). In OS2, researchers acted as pedestrians intending to cross the street at a crosswalk in Berkeley, California. A fellow researcher recorded whether drivers yielded right of way to the confederate pedestrian. As in OS1, research assistants rated the vehicle status of each car on the same 5-point scale mentioned above. Corroborating the results from OS1, in OS2 Piff et al. (2012) reported a positive correlation between vehicle status and the likelihood of not yielding right of way to pedestrians of $r = .17$, $p = .036$ ($N = 152$; controlling for time of day, driver's rated sex and age, and pedestrian's sex).

Extant Replications of Piff et al. (2012)

We searched for the previous replication attempts of OS1 and OS2. We thank Paul Piff for referring us to some of these conceptual, nonpreregistered, unpublished replications, which we discuss below.

Boyd, Huynh, and Tong (2015)

Jeremy Boyd and colleagues at UCSD conducted a replication of OS1 (Piff et al., 2012; $N_{\text{replication}} = 759$) at various intersections in San Diego, California (Boyd et al., 2015). This replication was an undergraduate class project. In OS1, apart from reporting the bivariate correlation between vehicle status and the likelihood of cutting off others, the authors also conducted a binary logistic regression and found a significant effect of vehicle status on the likelihood of cutting off other drivers (b = .36, $SE = .18$, $p < .05$), controlling for time of day, driver's perceived sex and age, and amount of traffic. In analyzing their replication data, Boyd et al. (2015) ran a logistic regression but also included the interaction of vehicle status and traffic amount; errors were clustered by coder, and intersections were entered as random effects. Like in the original, Boyd et al. (2015) found a significant effect of vehicle status on the likelihood of cutting off other drivers (b = .27, $p = .027$). We are grateful to Jeremy Boyd for sharing his data with us; we replicated his analysis and results.

Morling et al. (2014)

Beth Morling and colleagues (2014) ran a replication of OS2 (Piff et al., 2012) at intersections and crosswalks on the University of Delaware campus, Newark, DE ($N_{\text{replication}} = 240$). A replication report is available on the website https://www.PsychFiledrawer.org. We are grateful to Beth Morling for sharing her data with us. Our analysis yielded a correlation coefficient that was different from what had initially been reported on the website. Beth Morling subsequently corrected the reported correlation in the replication report. The corrected analysis shows that vehicle status and the likelihood of not yielding right of way to pedestrians correlate marginally, $r = .11$, $p = .088$. With a sample size 1.6 times larger than the original, the replication had a power of 76% to find the original effect at the 5% level; the replication is registered as successful on the website https://www.PsychFiledrawer.org. Like Boyd et al. (2015), this replication was an undergraduate class project.

Coughenour et al. (2020)

Courtney Coughenour and colleagues (2020) ran a conceptual replication study of OS2 in the Las Vegas metropolitan area. The authors considered the interplay between the cost of a car and stopping

[2] The scale in the original paper is described only as "1 = *low status*, 5 = *high status*." The scale described here was provided to us by Jeremy Boyd, who had received it from Paul Piff's lab manager at the time.

behavior for Whites and non-Whites using Kelley's Blue Book and recorded video images to estimate the sales value of the observed cars. The authors found a statistically significant odds ratio of car cost of .97, meaning that the odds that a car stops were .97 times the odds of a car stopping that costs 1,000 dollars less. The authors concluded: "... the majority of roadways in the study area is such that drivers feel comfortable driving at speeds much higher than the posted speed limit." It seems noteworthy that the average right-of-way yield rate was only 28%, much lower than the 65.1% rate reported in OS2. We requested the data from this research team to replicate their results. Unfortunately, our request could not be granted due to the institutional review board's requirement at one of the authors' institutions.

Our Pilot Replications

In 2016, we conducted three preregistered replications of OS1 and OS2. The details of these pilot replication studies can be found in Appendix A in the online supplemental materials. One pilot replication yielded inconclusive results, the other two pilot replications failed to find support for a positive correlation between vehicle status and likelihood to cut off others/yield to pedestrians.

Registered Replication Studies 1 and 2

Below we report our two registered replication studies. We followed the preregistered methods and analyses. All research assistants were first trained with the training materials approved by the review team. The details of the research assistant training, materials, and instructions can be found in Appendix B in the online supplemental materials. We note that we had planned that one group of four research assistants (RAs) would collect data for both RS1 and RS2 by the end of the spring semester of 2022. However, due to COVID-19 restrictions and more frequent pedestrian crossings at the new RS1 location, collecting data took longer than expected. Therefore, we recruited a second group of four research assistants to complete data collection for RS1 and RS2 in the summer of 2022 (the RAs from the spring semester were no longer available then).

Registered Replication Study 1

Method

Different from data collection for OS1 that took place at the four-way intersection of University Avenue and West Frontage Road in Berkeley, CA, we observed the behavior of drivers at the four-way intersection of Russell Street and College Avenue in Berkeley, CA. The original intersection was no longer suitable for data collection due to ongoing construction that blocked the view of the East–West traffic at the intersection. Because the new location has more pedestrian crossings compared to the original location, we excluded observations when pedestrians crossed any side of the four-way intersection per a reviewer's suggestion. We collected data on weekdays between March 9 and June 28, 2022; aiming for 2.5 times the original study's sample size ($N_{\text{original}} = 274$, $N_{\text{replication}} = 685$; cf., Simonsohn, 2015). The new location and times for data collection were approved by the review team. Due to an administration error made by the research assistants, two observations were lost, leaving us with 683 observations. With a correlation of $r = .12$ between vehicle status and the likelihood of cutting off as reported in OS1, RS1 had 88% power to detect the original effect at the 5% level (two-sided test).

To test the reliability of the RA's ratings, all research assistants went to the new location of RS1 and coded a set of 40 cars on vehicle status. The reliability tests in the field rendered a Cronbach's alpha of .76 for the spring semester research assistant team and .92 for the summer semester research assistant team. All research assistants were blind to the hypotheses.

At the field location, the research assistants stationed themselves out of drivers' sight at opposite corners of the intersection. Two research assistants recorded data from the traffic moving North or South, and the other two research assistants recorded traffic moving East or West. From their respective side of the highway, each coding team selected every other approaching vehicle before the car reached the stop sign. As in OS1, the coders recorded the drivers' cutting-off behavior (1 = yes, 0 = no), date and time of observation, vehicle status (OS1 scales adjusted for inflation: 1 = *cars worth $2,200 or less*; 2 = $2,200–11,130; 3 = *$11,130–27,825*; 4 = *$27,825–44,520*; 5 = *cars worth more than $44,520*), estimated gender and age of the driver (1 = *16–35 years*, 2 = *36–55 years,* 3 = *56 years and up*), and traffic density (the number of lanes with vehicles already stopped at the intersection when the target vehicle arrived at the intersection; name, age, and gender of confederates were also recorded).

Results

Table 1 compares the descriptive statistics of OS1 and RS1. There are two large differences between the two studies. First, the cutting-off rate was much higher in OS1 than it is in RS1. This might be at least partially attributable to the different locations. Specifically, the new location is a four-way intersection with two lanes for both the North–South and the East–West traffic, whereas the original location was a four-way intersection with four lanes for the East–West traffic and two lanes for the North–South traffic. Another difference between the two studies is the drivers' gender ratio. Specifically, in our replication, there were more male drivers (60%) than female drivers, whereas OS1 had only 36% of the drivers were male. It is unclear to us what produced this difference.[3] We can only speculate that the different sampling methods may have contributed to this difference. That is, while quasirandom sampling was used in OS1 whereby research assistants decided which cars to sample, a fixed "every other car" sampling was applied in RS1.

Figure 1 shows the observed frequency of cutting off other vehicles as a function of vehicle status. Unlike OS1, vehicle status and cutting off in RS1 were not significantly correlated, $r = .013$, $p = .73$ ($N = 683$; see Figure 1). Table 2 shows the preregistered binary logistic regressions of the likelihood of cutting off other vehicles on vehicle status, traffic density, time of day, and driver's age and sex. We report results for the two teams that coded cars

[3] According to Sivak and Schoettle (2012), although there were more female licensed drivers in 2010, females drive less than males such that the likelihood that a given driver on the road in 2010 was a female was less than 50 percent. According to the most recent data collected by the Federal Highway Administration (https://www.fhwa.dot.gov/policyinformation/statistics/2019/dl1c.cfm), 50.89% of all licensed drivers in California were males in 2019. If males tend to drive more than females, the ratio in our data (60% males) seems reasonable.

Table 1

Summary Descriptive Statistics of the Original Study 1 in Piff et al. (2012) and Our Registered Replication of the Original Study 1

Variable	Original Study 1 in Piff et al. (2012)	Registered replication Study 1
Prevalence of cutting off	12.4%	4.1%
Vehicle status (range: 1−5)	*M* = 3.16	*M* = 3.09
	SD = 1.07	*SD* = 1.01
Traffic density (range: 0−3)	*M* = 2.69	*M* = 1.31
	SD = 0.50	*SD* = 0.53
Driver's age (range: 1−3)	*M* = 1.70	*M* = 1.81
	SD = 0.59	*SD* = 0.74
Driver's gender	175 females	276 females
	99 males	405 males
Time of data collection	2 Fridays in June 2011 ∼ 3:00 p.m. to 6:00 p.m.	4 weekdays (Monday–Thursday) between March 9, 2022 and June 28, 2022, from 12:20 a.m. to 5:00 p.m.

from North to South (Column 1), for the two teams that coded cars from East to West (Column 2), and the two teams combined, using coder team random effects (Column 3). None of the models shows a significant relationship between vehicle status and the likelihood of cutting off (*p*s > .60).

Registered Replication Study 2

Method

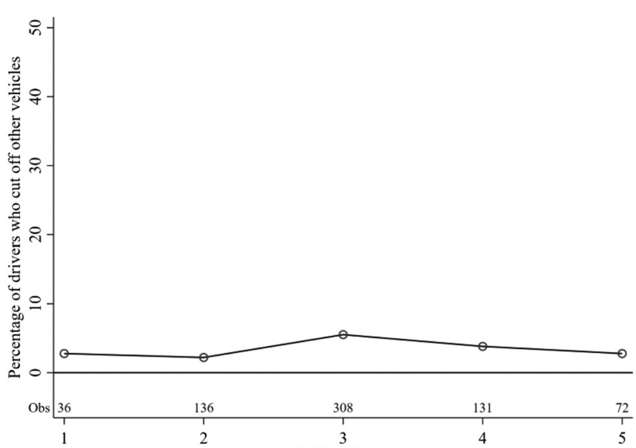
Different from data collection for OS2 that took place at the intersection of Bancroft Way and Dana Street in Berkeley, CA, we observed the behavior of drivers at the pedestrian crossing at a three-lane one-way street (2433 Durant Ave, close to Yoghurt Park) in Berkeley, CA, because the pedestrian crossing at the original location now has a traffic light. We collected data on weekdays between March 30 and June 28, 2022, aiming to collect a sample size that is 2.5 times the original study's sample size ($N_{\text{original}} = 152$, $N_{\text{replication}} = 394$). The new location and times for data collection were approved by the review team. With a correlation of $r = .17$ between vehicle status and the likelihood of not yielding right of way to pedestrians reported in OS2, RS2 had 93% power to detect the effect at the 5% level.

As in RS1, two teams of research assistants collected data for RS2. One group of four research assistants (a different group of RAs from the group in RS1 who collected data in the spring semester) coded the social status of 40 vehicles at the RS2 field location in the spring semester in 2022 (Cronbach's alpha of 0.88). As reported in the results section of RS1, the summer RAs' reliability test was done once and produced Cronbach's alpha of 0.92. Research assistants worked in teams of two. One pair of research assistants acted as a pedestrian intending to cross the street (the confederate acting as a pedestrian was always female). The other recorded the data. Research assistants recorded the drivers' likelihood of not yielding the right of way to the pedestrian (1 = did not yield, 0 = yield), date and time of observation, status and make of observed vehicles, estimated gender and age of the drivers, name and age of confederates, and whether drivers saw the confederate, using the same scales and coding schemes as in OS2. As in OS2, coders coded only vehicles in the lane closest to the pedestrian and only cars that approached the crosswalk when the confederate was the sole pedestrian. Furthermore, only after a vehicle crossed a designated point on the road a few meters away from the crosswalk did the pedestrian enter the beginning of the crosswalk and looked toward the oncoming vehicle, thereby signaling his or her intent to cross. Lastly, a vehicle was only coded if there were no other vehicles in front of it when it passed the designated point on the road.

Table 3 shows the descriptive statistics for the recorded variables. For comparison, the descriptive statistics from OS2 are included. As in RS1, we observed the behavior of many more male drives in RS2 than Piff et al. (2012) did in OS2.

Figure 1

Percentage of Drivers That Cut Off Other Vehicles at the Four-Way Intersection in Replication Study 1



Note. For vehicle status, we adopted the original scale with dollar values adjusted for inflation between 2012 and 2019 by applying a cumulative inflation rate of 12%. This yielded the following scale: 1 = *cars worth $2,200 or less*; 2 = *$2,200–11,130*; 3 = *$11,130–27,825*; 4 = *$27,825–44,520*; 5 = *cars worth more than $44,520*. The Y-axis is the percentage of drivers who cut off other vehicles at the intersection.

Results

Table 3 compares the descriptive statistics of RP2 and OS2. RP2 records higher cutting behavior than OS2. As in RP1, our

Table 2
The Logistical Regression Result of Replication Study 1

Variable	(1)	(2)	(3)
Vehicle status	0.109 (0.351)	0.086 (0.252)	0.071 (0.201)
Traffic density	1.241** (0.552)	1.315*** (0.347)	1.343*** (0.290)
Age	0.488 (0.548)	0.0414 (0.345)	0.130 (0.285)
Gender (1 = Female)	−1.399 (1.085)	0.169 (0.502)	−0.196 (0.426)
Time of day	−0.000 (0.000)	0.000 (0.000)	−0.000 (0.000)
Constant	−6.414*** (1.918)	−5.024*** (1.323)	−5.550*** (1.135)
Coder pair [random effect]			−0.467 (0.628)
Observations	421	258	679

Note. Significance levels of *p* values are specified in text below the table. The numbers in parentheses present the standard errors of the estimates. The dependent variable was whether or not a driver cuts off the other vehicles (coded 1 = yes, 0 = no). Vehicle status (1–5) measures the social class of a vehicle. Traffic density (1–3) measures how many lanes are occupied by other traffic when the target vehicle arrives. Age (1 = *16–35*, 2 = *36–55*, 3 = *56 and up*) measures the estimated age of the driver. Gender has a value of 1 when the driver is a female. Time of day measures at what time of the day a vehicle was coded, measured from 12 p.m.
** $p < .05$. *** $p < .01$.

data records more male drivers (76%) than OS2 does (52%). Unlike OS2, no significant relationship between vehicle status and observed frequency of cutting off the confederate pedestrian was found, $r = -.028$, $p = .58$ ($N = 394$; see Figure 2). Table 4 shows the preregistered binary logistic regression of the likelihood of cutting off the confederate pedestrian on vehicle status, time of day, and driver's age and sex.

General Discussion

Whether rich individuals are more likely to behave unethically/selfishly than less wealthy individuals is a question that continues to puzzle researchers and grab headlines in mass media. The study of Piff et al. (2012) is one of the most influential articles on this topic, but several researchers have provided mixed conclusions about the validity of the original findings. A research finding is most useful when it has reliable predictive power beyond the narrow specificity of the original study setting. In this registered replication report, we strove to keep our study designs as close as possible to the original study designs, yet we did not replicate the original findings: the correlations between SES and the likelihood of cutting off others in RS1 and RS2 were not significant.

This is our second attempt at replicating the original findings in the field (the results of our first attempt can be found in Appendix A in the online supplemental materials). The null results in both of our replication attempts make it hard to determine not only the direction of the relationship between SES and unethical behavior but also whether a relationship exists at all. It is possible that the observed relationship in Piff et al. (2012) indeed existed in 2012 but faded over the next decade. Alternatively, the relationship between SES and unethical behavior might be sensitive to specific features of the contexts.

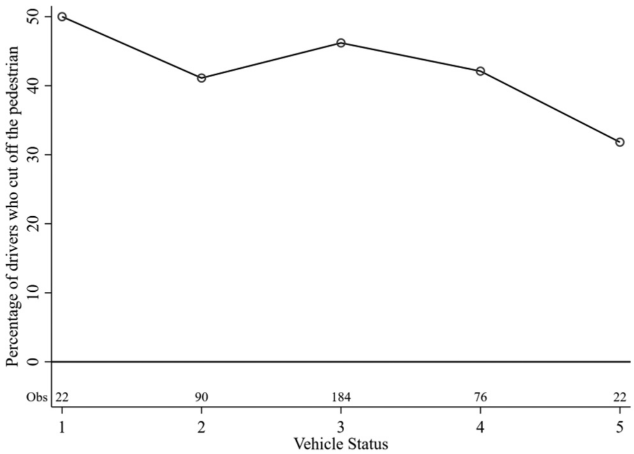
Of course, the changing nature of the field environment prevented us from adopting all the features of the original designs, and one may attribute the lack of an effect in our studies to one or more of the differences in the field environments of the replications and original studies. First, traffic density was lower in RS1 than in OS1. Controlling for traffic density did not affect the impact of vehicle status on the likelihood of cutting off, but traffic density may have affected the results indirectly. Specifically, traffic density affects the observability of traffic violations, and observability is known to increase prosocial behavior among subjects of higher status (e.g., Kraus & Callaghan, 2016).

Second, the overall cutoff rate in RS1 (4.1%) was lower than that observed in OS1 (12.4%). The two studies were conducted at

Table 3
Summary Descriptive Statistics of the Original Study 2 in Piff et al. (2012) and Our Registered Replication of the Original Study 2

Variable	Original Study 2 in Piff et al. (2012)	Registered replication Study 2
Prevalence of not yielding to pedestrian	34.9%	43.6%
Vehicle status (range: 1−5)	*M* = 3.22 *SD* = 0.96	*M* = 2.96 *SD* = 0.93
Driver saw confederate	152 yes 0 no	364 yes 30 no
Driver's age (range: 1−3)	*M* = 1.66 *SD* = 0.69	*M* = 1.87 *SD* = 0.73
Driver's sex	72 females 80 males	95 females 299 males
Time of data collection	3 weekdays in June 2011 ∼ 2:00 p.m. to 5:00 p.m.	4 weekdays (Monday–Thursday) between March 9, 2022 and June 28, 2022, from 12:20 a.m. to 5:00 p.m.

Figure 2
Percentage of Cars That Cut Off the Pedestrian at the Four-Way Intersection in Replication Study 2



Note. For vehicle status, we adopted the original scale with dollar values adjusted for inflation between 2012 and 2019 by applying a cumulative inflation rate of 12%. This yielded the following scale: 1 = *cars worth $2,200 or less*; 2 = *$2,200–11,130*; 3 = *$11,130–27,825*; 4 = *$27,825–44,520*; 5 = *cars worth more than $44,520.* The Y-axis is the percentage of drivers who cut off a pedestrian crossing.

different intersections in Berkeley, California, because changes to the original intersection made it unsuitable for RS1. The difference in location may help explain the difference in the cutoff rate; RS1 took place near shops and restaurants, whereas OS1 took place near a highway. One may wonder about the statistical power to detect an effect given the lower cutoff rate. We evaluated this concern by simulating data with our increased sample size of $N = 685$ (2.5 times the original, $N = 274$), a lower overall cutoff rate of 5.0%, and the original difference in the cutoff likelihoods (20.9 percentage points between vehicle status Categories 1 and 5, as in OS1). Table 5 shows the data from OS1 alongside the simulated data.

For both data sets, we estimated a logistic regression of the frequency of cutoffs on vehicle status. The estimated effect in the simulated RS1 data ($b = .86$, $SE = .20$, Wald $\chi^2 = 18.55$, $p < .00001$) is much stronger than the estimated effect in the OS1 data

Table 4
The Logistical Regression Result of Replication Study

Variable	Cutting off pedestrian
Vehicle status	−0.074 (0.110)
Age	−0.143 (0.139)
Gender (1 = Female)	0.179 (0.237)
Time of day	−0.000 (0.000)
Constant	0.224 (0.453)
Observations	394

Note. The dependent variable was whether or not drivers cut off a pedestrian. Vehicle status (1–5) measures social status of the driver of a target vehicle. Age (1 = *16–35*, 2 = *36–55*, 3 = *56 and up*) measures the estimated age of the driver. Gender has a value of 1 when the driver is a female. Standard errors are shown in parentheses.

Table 5
Observed Cutoff Rates in OS1 (N = 274) and in Simulated RS1 Data (N = 685)

Vehicle status	OS1 Frequency	Simulated RS1 Frequency
1	2 [24]	0 [65]
	7.7%	0%
2	2 [31]	0 [82]
	6.1%	0%
3	15 [114]	16 [287]
	13.2%	5.6%
4	7 [74]	4 [184]
	9.5%	2.2%
5	8 [27]	14 [67]
	29.6%	20.9%
Overall	34 [274]	34 [685]
	12.4%	5.0%

Note. Numbers indicate the number of cars that cutoff within a vehicle status category, numbers in square brackets indicate the total number of cars in that vehicle status category.

($b = .37$, $SE = .18$, Wald $\chi^2 = 3.94$, $p = .047$). The simulation results suggest that the lower overall cutoff rate in RS1 is unlikely to explain why we did not observe an effect.

Lastly, we observed smaller proportions of female drivers in both of our replications (RS1: 40.5%, RS2: 24.1%) than in the original studies (OS1: 63.9%, OS2: 47.4%). On average, males drive more than females (13,393 vs. 9,854 miles per year, respectively; Federal Highway Administration, 2018), consistent with the observed gender ratios in RS1 and RS2. The difference between the replications and original studies might be driven by differences in the sampling methods. Although the difference is striking, gender was controlled for in both the original and replication studies, so we believe the difference is unlikely to explain why we did not find an effect of vehicle status on the likelihood of cutting off.

The differences between the original studies and our replications are a vivid reminder that there is no such thing as an "exact direct replication" (Zwaan et al., 2018), especially when the replication attempts occur 10 years after the original studies and are conducted by a different group of researchers. The intervening decade may have brought changes in social norms, the driving behaviors of men and women, the income distribution and demographics at the sites of data collection, etc. The question is not whether the replications differ from the originals but rather how they differ—and whether the differences are theoretically meaningful. Furthermore, Zwaan et al. (2018) argue that if the differences are held responsible for the failure of a replication, it must also be explained

> how the original authors happened upon the exact set of conditions that led to the predicted result in the first place . . . [. . .]. If researchers do not know enough about a phenomenon to predict when it will and when it will not be replicated, it is not possible for subsequent research to build on this individual finding. If findings are so tenuous that replication results cannot be taken for granted, it is difficult, if not impossible, for new knowledge to build on the solid ground of previous work . . . [. . .]. It would be gravely

> mistaken to speculate about the applied value of such a research program in published papers. (p. 7)

Our replication cannot provide an authoritative answer to the question of whether drivers of cars that indicate higher (vs. lower) SES are more likely to violate traffic laws at the expense of others. Rather, our replications are one more piece of evidence in the debate about the relationship between SES and ethical/prosocial behavior, and our data do not support the view that people of higher SES behave more unethically.

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