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Napoleon Complex: Height Bias Among National Basketball Association Referees

Paul Gift[1] and Ryan M. Rodenberg[2]

Abstract

Given the vast number of observations in a transparent environment, the interaction between players and referees in the National Basketball Association (NBA) provides a real-world laboratory that allows for observation and testing of implicit height-based biases (the so-called "Napoleon Complex"). Controlling for a plethora of referee-specific characteristics and including 4,463 regular season games from 2008 to 2012, we find that (i) more personal fouls are called when a relatively shorter three-person officiating crew is working and (ii) no more or fewer fouls are called when games involve relatively taller players. Such biases are probably not large enough to impact game outcomes but could affect gambling markets. Our findings support the conclusion that relatively shorter NBA referees officiate basketball games differently than their taller peers. The analysis spotlights an oft-suggested but rarely studied bias in a workplace where employees are heavily scrutinized and monitored.

Keywords

implicit discrimination, referee bias, basketball

[1] Graziadio School of Business and Management, Pepperdine University, Los Angeles, CA, USA
[2] Department of Sport Management, Florida State University, Tallahassee, FL, USA

Corresponding Author:
Paul Gift, Graziadio School of Business and Management, Pepperdine University, 6100 Center Drive, Los Angeles, CA 90045, USA.
Email: paul.gift@pepperdine.edu

Introduction

Bertrand, Chugh, and Mullainathan (2005) posit that implicit discrimination, unlike conscious discrimination, is "unintentional and outside of the discriminator's awareness" (p. 94). Testing for such discrimination in the workplace or within the fabric of social life is difficult, given its nonvolitional nature. The so-called "Napoleon Complex" is a height-related bias that may influence one's evaluation of others due to certain embodied cognitions, where (relatively) shorter males may exhibit aggressive behavior vis-à-vis taller males (Fleming, 2008). We test for height bias using a unique data set from a real-world setting where employees are heavily scrutinized and evaluated—professional referees in the National Basketball Association (NBA).

The transparency and availability of detailed data evidencing the interaction between referees (or umpires or judges) and competitors has led to many recent economic studies of possible bias among sports officials. Outside of basketball, bias and discrimination among game officials have been detected in baseball (Parsons, Sulaeman, Yates, & Hamermesh, 2011), American football (Kitchens, 2014), soccer (Dohmen, 2008; Garicano, Palacios-Huerta, & Prendergast, 2005; Sutter & Kocher, 2004), ice hockey (Brimberg & Hurley, 2009; Lopez & Snyder, 2013), figure skating (Zitzewitz, 2006, 2014), gymnastics (Morgan & Rotthoff, 2014), and boxing (Balmer, Nevill, & Lane, 2005).

Research specific to possible basketball referee bias has been undertaken on the basis of race (Price & Wolfers, 2010), fairness (Anderson & Pierce, 2009; Thu et al., 2002), home advantage (Lehman & Reifman, 1987; Moskowitz & Wertheim, 2011; Shmanske, 2008), makeup calls (Gift, 2012), nongambling pecuniary reasons (Price, Remer, & Stone, 2012), betting purposes (Chin, 2012; Griffin, 2011), personal animus (Rodenberg, 2011; Winston, 2009), age (Herring, 2012), play-off series manipulation (Zimmer & Kuethe, 2009), and aggressive play (Berri & Rodenberg, 2011). In the course of responding to a media inquiry pertaining to the findings of Price, Remer, and Stone (2012), NBA president Joel Litvin opined, "I do believe, and I think it is the case, that [NBA referees] are, in fact, immune to the things that you and I would say are just human nature" (Bachman, 2009).

In the wake of a gambling scandal involving one of its own referees (Donaghy, 2009), the NBA commissioned an investigation that highlighted the impact of possible referee bias from a firm governance perspective (Pedowitz, 2008). Recently retired NBA commissioner David Stern concurred, stating that "There is nothing as important as the integrity of our game and covenant we have with our fans. In order to preserve their trust, we will make every effort to ensure that our processes and procedures are the best they can be" (NBA Media Ventures, 2007). Our inquiry here is consistent with Stern's observation.

Economic and psychological analyses of height and stature have been undertaken on multiple fronts, including labor outcomes as a function of cognitive ability (Case & Paxson, 2008), workplace success and income (Judge & Cable, 2004), and

as a form of health human capital (Schultz, 2002). Mankiw and Weinzierl (2010) suggested a "height tax" on taller individuals as part of a discussion on utilitarian income redistribution. The roots of the Napoleon Complex,[1] sometimes called the "short man syndrome," are found in the interconnected biology and evolution literatures, with the phenomenon sometimes manifesting itself in jealousy (Buunk, Park, Zurriaqa, Klavina, & Massar, 2008) and picking fights (Just & Morris, 2003).

If a Napoleon Complex exists, we posit that it could be found in NBA basketball refereeing, an environment with near-instantaneous decision making and no time for reflective contemplation by the on-court officials. For example, a former college basketball coach and current radio talk show specifically posited that shorter referees call the game closer. Our resulting research question is twofold. First, do shorter NBA referees call more fouls than their taller peers? Second, do shorter NBA referees officiate basketball games differently depending on the height of players? We find strong evidence that shorter referees call more fouls than their taller peers, but no evidence that the rate of foul calling varies with the players' heights.

NBA and NBA Referee Background

The NBA is an unincorporated association of 30 individually owned franchises in the United States and Canada. The NBA acts as the governing body of the league, with authority to set and enforce a vast number of rules pertaining to game competition and other facets of highly commercialized, elite professional basketball. Each year, the NBA employs about 60 referees. NBA referees are members of a union called the National Basketball Referees Association (NBRA). The NBA and the NBRA enter into a collective bargaining agreement that sets forth the terms and conditions of employment for all member referees. As the on-court regulators, the NBA referees are charged with (evenly) enforcing the rules of basketball. The NBA collects and analyzes data on referee performance but does not release the data.

In 2007, two incidents called into question the impartiality of the NBA referees. First, the Federal Bureau of Investigation revealed that it was investigating an NBA referee for illegal sports gambling, including betting on games he was officiating. The NBA subsequently hired a prominent law firm to investigate multiple aspects of the scandal and generate a report (Pedowitz, 2008). The resulting Pedowitz Report made two bias-related findings: (i) referee bias threatens the integrity of NBA games (p. 57) and (ii) a number of representatives from individual teams believe bias sometimes influences referee calls (p. 56). Second, the *New York Times* ran a front-page story (Schwarz, 2007) detailing an academic study (Price & Wolfers, 2010) that found implicit racial bias by NBA referees in the form of more fouls called against opposite-race players. Berri and Rodenberg (2011) detailed the resulting media firestorm, which included the NBA's attempting to discredit the underlying academic study (Abbott, 2010) and a follow-up study critiquing the NBA's own analysis (Price & Wolfers, 2012).

Data

Our data set includes all regular season games played over four full NBA seasons: 2008-2009 through 2011-2012. It contains information on 4,463 games and 90,389 player-games.[2] Player box score statistics, height, age, position, and game-starting status were obtained from basketball-reference.com. Referee game assignments were obtained from phillyref.com and referee-specific characteristics were obtained from the NBA Officials Media Guide.[3]

Referee-specific characteristics include (i) age; (ii) years of NBA officiating experience; (iii) whether the referee played varsity-level college basketball; (iv) whether the referee earned an undergraduate degree; (v) whether the referee earned a graduate degree; and (vi) race. In addition, we include measures of referee quality. The NBA keeps its own internal ratings of referees and uses a proprietary statistical evaluation tool to determine which most highly qualified officials will work the play-offs (Pedowitz, 2008; Price & Wolfers, 2010). We do not have access to this information but can create general proxies for the NBA's own view of referee performance during each respective regular season. Our two measures of referee quality are indicator variables that equal 1 if the referee was selected to officiate in the NBA play-offs and if the referee was selected to officiate in the championship series, the NBA Finals. Quality is measured during each of the four respective seasons in our sample period.

Our primary variable of interest is referee height. This is the only referee-specific characteristic not in the public domain, as the NBA (apparently) does not keep such records (Beck, 2010), and the information is not published in the annual NBA Officials Media Guide. Referee height was measured in three ways. First, we interviewed a former NBA referee who informed us of the height of his ex-colleagues according to his personal recollection. Second, we obtained a photograph of every referee in our data set featuring him standing next to a player whose height was known via official NBA records. Third, we obtained a digital video clip of each referee in our data set and compared it to known player heights.

We examine regular season games only. During the regular season, the NBA effectively randomizes referee assignments (Price & Wolfers, 2010). Referee assignments for the much smaller subset of play-off games are nonrandom, with the NBA selecting referees deemed to be of the highest quality.

The officiating crew for each game consists of three referees. The relationship of player height to the average height of the three-person referee crew for each season appears in Table 1. Crews are divided into three mutually exclusive categories according to the crews' average height: (i) 6′0″ and under; (ii) between 6′0″ and 6′3″; and (iii) 6′3″ and above. For each season, the average player height does not vary with average crew height, supporting the notion that crew assignments are not systematically related to the height of a team's players. Table 2 presents a variety of player, game, and referee summary statistics in the aggregate and subdivided

Table 1. Player Height by Season and Referee Crew Type.

Season	Mean by Referee Crew Average Height			ANOVA (*p* value)	Games	Player Games
	≤6′0″	6′0″–6′3″	≥6′3″			
2008-2009	78.93	78.88	78.90	.73	1,168	23,245
2009-2010	78.85	78.86	78.90	.83	1,223	24,518
2010-2011	78.92	78.91	78.93	.92	1,164	23,686
2011-2012	78.84	78.83	78.85	.97	908	18,940

Note. Each observation is a player-game during the regular season. All statistics are weighted by minutes played.

Table 2. Summary Statistics for Player, Game, and Referee Characteristics.

	All Data		Mean by Referee Crew Average Height			ANOVA (*p* Value)
	Mean	*SD*	≤6′0″	6′0″–6′3″	≥6′3″	
Player/game characteristics						
Height (inches)	78.88	3.51	78.89	78.87	78.90	.72
Age	27.11	4.11	27.10	27.13	27.06	.25
Starter	.65	.48	.66	.65	.65	.55
Guard	.43	.50	.43	.43	.43	.93
Forward	.46	.50	.46	.46	.46	.98
Center	.11	.31	.11	.11	.11	.93
Home game	.50	.50	.50	.50	.50	1.00
Win	.50	.50	.50	.50	.50	1.00
Referee characteristics						
Height (inches)	73.52	1.25	71.57	73.47	75.54	.00
Age	45.62	4.39	48.14	45.36	44.63	.00
NBA experience (years)	12.97	3.35	14.92	12.90	11.62	.00
Refs quality (worked) play-offs	.60	.20	.61	.60	.56	.00
Refs quality (worked finals)	.21	.17	.18	.21	.22	.00
Played basketball in college	.22	.24	.22	.22	.21	.00
College degree	.70	.27	.66	.71	.67	.00
Graduate degree	.07	.14	.09	.07	.06	.00
White	.57	.28	.57	.56	.59	.00
Sample size						
Games	4,463		591	3,211	661	—
Player-games	90,389		11,925	64,989	13,475	—

Note. ANOVA = analysis of variance; NBA = National Basketball Association; *SD* = standard deviation. Each observation is a player-game during the regular season. All statistics are weighted by minutes played.

Table 3. Player Performance Statistics.

	All Data		Mean by Referee Crew Average Height			ANOVA
	Mean	*SD*	≤6′0″	6′0″–6′3″	≥6′3″	(*p* Value)
Minutes played	23.89	11.40	23.99	23.90	23.75	.20
Performance per 48 min						
Personal fouls	4.08	3.20	4.13	4.09	4.03	.03
Field goals made	7.38	4.08	7.34	7.39	7.36	.40
Field goals attempted	16.14	6.55	16.10	16.13	16.17	.68
3-Pointers made	1.29	1.93	1.27	1.29	1.27	.27
3-Pointers attempted	3.60	3.87	3.56	3.62	3.58	.19
Free throws made	3.64	3.90	3.71	3.65	3.56	.00
Free throws attempted	4.78	4.78	4.86	4.79	4.68	.01
Offensive rebounds	2.19	2.72	2.19	2.19	2.21	.70
Defensive rebounds	6.07	4.23	6.05	6.06	6.11	.37
Assists	4.20	4.04	4.14	4.21	4.21	.24
Steals	1.46	1.77	1.46	1.46	1.46	.93
Blocked shots	.97	1.71	1.00	.97	.96	.09
Turnovers	2.70	2.47	2.72	2.71	2.66	.12
Points scored	19.69	10.31	19.66	19.72	19.54	.19
Shooting percentages						
Field goal percentage	45.7%	17.3%	45.6%	45.8%	45.5%	.15
3-Pointer percentage	35.7%	26.1%	35.9%	35.8%	35.4%	.53
Free throw percentage	76.2%	23.5%	76.4%	76.2%	76.0%	.54
Sample size						
Games	4,463	591	3,211	661	—	
Player-games	90,389	11,925	64,989	13,475	—	

Note. ANOVA = analysis of variance; *SD* = standard deviation. Each observation is a player-game during the regular season. Performance statistics are weighted by minutes played. Shooting percentages are weighted by the relevant number of shot attempts.

according to the average crew height. The top panel shows that player characteristics do not vary by crew height. This provides further evidence that crew assignments are independent of referee height and as evidence that coaches do not make in-game playing time decisions based on the average height of the referee crew. The bottom panel reveals that referee characteristics systematically vary by referee height. This underscores the potential importance of controlling for such characteristics when undertaking our analysis.

Table 3 examines player performance statistics and their relationship to referee crew height. Only three player performance statistics significantly vary with crew height: personal fouls, free throws made, and free throws attempted.[4] These results are notable. First, the number of personal fouls called increased significantly as the average height of referee crews decreased. Second, as expected given the increased

number of fouls called, the number of free throws made and attempted increased as the referee crews became shorter.

Hypothesis and Methodology

The highly monitored nature of NBA basketball refereeing, with its frequent and instantaneous decision making, is a near-ideal setting to test for implicit height bias as an expression of the Napoleon Complex. Our two hypotheses are (1) shorter NBA referees call more fouls than their taller peers and (2) the differences in foul calls between short and tall referees increases when the players are taller. As Mongeon and Longley (2013) note, it is important to investigate impacted groups subject to latent discrimination. We are also motivated to investigate this issue, given the aforementioned comments in the Pedowitz Report and statements by NBA president Litvin and ex-commissioner Stern. For example, Price and Wolfers (2010) quote Stern as saying NBA referees ''are the most ranked, rated, reviewed, statistically analyzed and mentored group of employees of any company in any place in the world'' (p. 1859).

The 4-year window of our data set follows the two high-profile incidents in 2007, involving NBA officials discussed in detail earlier. As a result, referees probably underwent closer scrutiny than in previous years. Such scrutiny helps our analysis because the referees employed by the NBA after the dual incidents were more aware that they were being closely monitored by NBA officials, journalists, academics, and spectators (Pope, Price, & Wolfers, 2013). Rational referees who were aware of any volitional biases they may have had would have an incentive to conceal such biases, leaving only implicit, nonintentional biases remaining.

We use a linear regression model with 90,389 player-game observations. The dependent variable is Personal Fouls per 48 Min. Player, game, and referee characteristics are included as controls for possible confounding factors in the analyses. All referee characteristics are the average values over the three-person crew. Three specifications are tested for each hypothesis, with player, player-season, and referee fixed effects included when statistically possible. Player fixed effects control for all time-invariant characteristics for each player that affect their personal foul rate, such as their style of play, position, hustle factor, and defensive prowess. Player-season fixed effects allow for the possibility that these player factors, NBA rules, or referee points of emphasis may change in between seasons. Using player-season fixed effects is a more robust specification than using separate player and season fixed effects. Finally, referee fixed effects control for all time-invariant characteristics for each referee such as their foul calling and game management philosophies, educational and basketball background, race, and height. Since height is a time-invariant referee characteristic, referee fixed effects cannot be included in any specifications involving Hypothesis 1.

Our model is:

$$\begin{aligned}\text{Personal Fouls } 48_{igtr} = {} & \beta_0 + \beta_1\ \text{Player Height}_i + \beta_2\ \text{Refs Height}_r \\ & + \beta_3\ \text{Player Age}_{ig} + \beta_4\ \text{Starter}_{ig} + \beta_5\ \text{Forward}_i \\ & + \beta_6\ \text{Center}_i + \beta_7\ \text{Home Game}_{gt} + \beta_8\ \text{Refs Age}_{gr} \\ & + \beta_9\ \text{Refs NBA Experience}_{gr} + \beta_{10}\text{Refs Quality } 1_{gr} \\ & + \beta_{11}\text{Refs Quality } 2_{gr} + \beta_{12}\ \text{Refs Played in College}_r \\ & + \beta_{13}\ \text{Refs College Degree}_r + \beta_{14}\ \text{Refs Grad Degree}_r \\ & + \beta_{15}\ \text{Refs White}_r + \text{player}_i\Big(\text{or player} - \text{season}_{ig}\Big) \\ & \quad \text{fixedeffects}[+\ \text{RefsHeight}_r \\ & \times \text{player, game, and referee characteristics}] + \varepsilon_{igtr},\end{aligned}$$

where *igtr* denotes player *i* playing in game *g* for team *t* with referee crew *r*. The dependent variable is Personal Fouls Per 48 Min.

For Hypothesis 1, the coefficient of interest is that of the average height of the referee crew (β_2). For Hypothesis 2, we adjust the model to include the interaction of player height and referee crew average height (and sometimes referee fixed effects). The coefficient of interest changes to that of the interaction term (Player Height × Refs Height). In this case, we test how the marginal effect of referee crew height changes as the recipient player's height changes.

Our methodology is consistent with the existing literature on the issue of referee bias. It closely mirrors that of Price and Wolfers (2010) on two counts. First, we use Personal Fouls Per 48 Min as the dependent variable in our analyses. Second, we adopt a similar empirical strategy to test for the interaction between NBA referee and player characteristics.[5] Doing so allows us to compare the magnitude of our coefficients with those of Price and Wolfers. Also, our methods are related to the nationalistic focus of Gallo, Grund, and Reade (2013) in the context of soccer, as we look at interaction effects between referee and player. Although our height-related focus is analogous to Van Quaquebeke and Giessner (2010) who investigated player height and foul calling in soccer, we differ from Van Quaquebeke and Giessner in that our analysis accounts for both referee height and player height. Van Quaquebeke and Giessner did not consider referee height in their analysis, instead focusing solely on player height and foul calling.

Empirical Results

Table 4 presents the regression results for Hypothesis 1. Starters appear to have a smaller foul rate than bench players. The strong, negative coefficient on Home Game is consistent with the findings of Price et al. (2012) that referees favor home teams. The strong, negative coefficient on Refs White is consistent with the general findings of Price and Wolfers (2010) that majority-White referee crews call fewer

Table 4. Dependent Variable: Personal Fouls Per 48 Min.

	(1)		(2)		(3)	
Independent variables	β	*SE*	β	*SE*	β	*SE*
Player Height (inches)	.067***	.005				
Refs Height (inches)	−.030***	.008	−.015**	.007	−.017**	.007
Player Age	−.028***	.002	−.140***	.009	−.893***	.071
Player Starter	−1.201***	.021	−.743***	.026	−.648***	.031
Player Forward	.572***	.032				
Player Center	1.662***	.052				
Home Game	−.171***	.019	−.172***	.018	−.172***	.017
Refs Age	−.011***	.004	−.016***	.004	−.010**	.004
Refs NBA Experience	.014***	.005	.017***	.005	.010**	.005
Refs Quality (worked play-offs)	−.043	.050	.004	.048	.032	.048
Refs Quality (worked finals)	−.027	.058	.007	.055	.006	.055
Refs Played in College	.133***	.043	.040	.041	.047	.041
Refs College Degree	.093**	.038	.051	.036	.052	.036
Refs Grad Degree	.125*	.067	.114*	.064	.131**	.064
Refs White	−.136***	.035	−.167***	.033	−.161***	.033
Player Fixed Effects	No		Yes		No	
Player-Season Fixed Effects	No		No		Yes	

Note. NBA = National Basketball Association; *SE* = standard error. Each "Refs" variable observation is the sample average of the three-person referee crew for the particular game. When Refs Height is interacted with player, game, and referee characteristics, its average marginal effect is qualitatively the same in magnitude and significance as the respective coefficients on Refs Height above for each specification. All standard errors are White corrected.
***, **, and * indicate the significance at the 1%, 5%, and 10% levels, respectively.

fouls than majority-Black crews. It is also interesting to note that both measures of referee quality are insignificant in all specifications, suggesting that the NBA's view of referee quality is unrelated to the quantity of calls.

We find evidence that shorter referee crews call more personal fouls than their taller counterparts across all three specifications.[6] Using Specification 3 with full player-season fixed effects, there tend to be .017 fewer personal fouls called per 48 min for every additional inch of crew height.[7] The largest observed difference in crew height in our data is 8⅔ inches. This implies that the tallest crew calls an average of 0.147 fewer fouls than the shortest crew or 3.6% of the average number of personal fouls (4.08). Price and Wolfers estimate the maximum impact of race at .18–.20 personal fouls per 48 min or 4–4.5% of the average number. Thus, our findings on height-based bias are similar but smaller in magnitude than their findings regarding race.

Table 5 presents the regression results for Hypothesis 2. In these three specifications, the marginal effect of referee crew height is allowed to vary with the foul recipient player's height. Our coefficient of interest is that of the player and referee crew height interaction term. In all three specifications, the estimate is negative but

Table 5. Effect of Referee Crew Height on Personal Fouls as Player Height Increases.

Dependent Variable: Personal Fouls Per 48 min						
	(1)		(2)		(3)	
Independent variables	β	*SE*	β	*SE*	β	*SE*
Refs Height (inches)	.106	.160	.026	.161		
Player Height						
Refs Height	−.002	.002	−.001	.002	−.001	.002
Player Age	.140***	.009	−.893***	.071	−.826***	.078
Player Starter	−.743***	.026	−.648***	.031	−.648***	.031
Home Game	−.172***	.018	−.172***	.017	−.172	.017
Refs Age	−.016***	.004	−.010**	.004	−.095***	.030
Refs NBA Experience	.017***	.005	.010**	.005	.042	.026
Refs Quality (worked play-offs)	.004	.048	.032	.048	−.163**	.081
Refs Quality (worked finals)	.007	.055	.006	.055	.086	.090
Refs Played in College	.040	.041	.047	.041		
Refs College Degree	.051	.036	.052	.036		
Refs Grad Degree	.113*	.064	.131*	.064		
Refs White	−.167***	.033	−.161***	.033		
Player Fixed Effects	Yes		No		No	
Player-Season Fixed Effects	No		Yes		Yes	
Referee Fixed Effects	No		No		Yes	

Note. NBA = National Basketball Association; *SE* = standard error. Each "Refs" variable observation is the sample average of the three-person referee crew for the particular game. All standard errors are White-corrected. ***, **, and * indicate the significance at the 1%, 5%, and 10% levels, respectively.

insignificant. Thus, there is no strong evidence that shorter referee crews call more personal fouls on taller players than their taller referee counterparts.

This finding may hold in an absolute sense, but it also may be a function of the height distributions in our sample. Suppose referees were implicitly inclined to call more personal fouls on players who are taller than they are and fewer fouls on players who are shorter. Figure 1 shows that most players are taller than the referee crews. Thus, the estimation routine would not pick up this type of implicit bias since we do not observe enough players who are shorter than the referee crew. Our findings thus suggest that shorter referee crews do not call relatively more personal fouls on taller players, with the caveat that we do not observe what would have happened had a sufficient number of players been shorter than the referee crews.

Discussion

We find evidence that shorter NBA referees call more personal fouls than their taller peers. This difference can be up to 3.6% of the average number of personal fouls

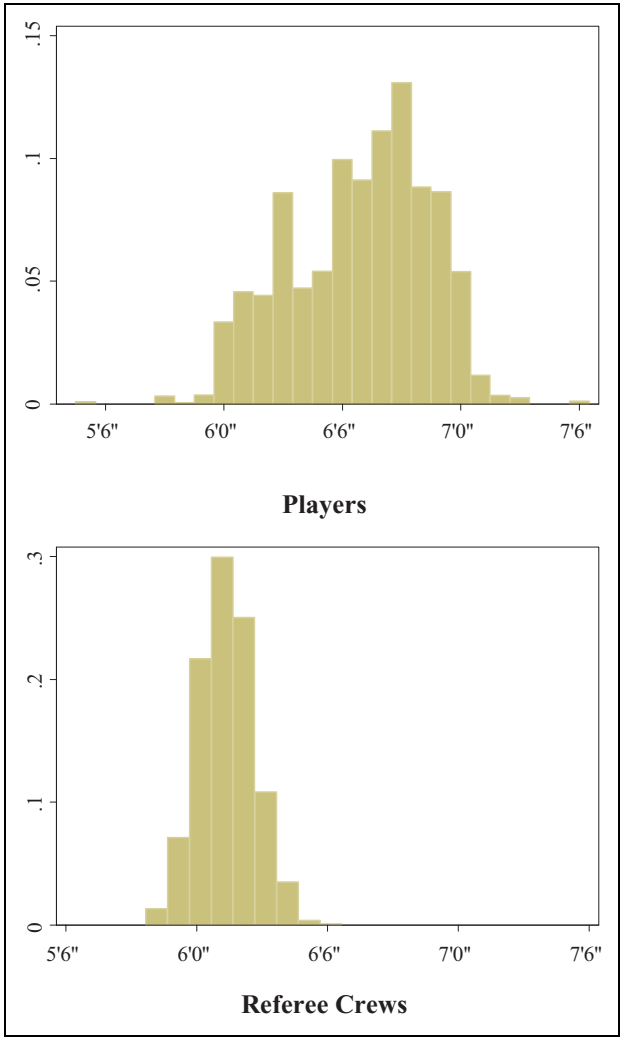

Figure 1. Distribution of player and referee crew heights.

called per game. These findings are consistent with that of Price and Wolfers (2010) who found that "more personal fouls are awarded against players when they are officiated by an opposite-race officiating crew than when they are officiated by an own-race refereeing crew" (p. 1859). While up to a 3.6% change in the number of personal foul calls per game is considerable, Table 6 provides evidence on the impact of referee crew height on other performance statistics. Since shorter referee crews tend to call more fouls, they also cause more free throw attempts and free throws made. However, no other performance statistics are meaningfully affected. The

Table 6. Effect of Referee Crew Height on Other Player Performance Statistics.

Dependent Variable	β	*SE*
Field Goals Made	.006	.010
Field Goals Attempted	.011	.015
3-Pointers Made	.002	.005
3-Pointers Attempted	.008	.007
Free Throws Made	−.038***	.010
Free Throws Attempted	−.051***	.012
Offensive Rebounds	.003	.006
Defensive Rebounds	.006	.010
Assists	.011	.009
Steals	.002	.005
Blocked Shots	−.001	.004
Turnovers	−.005	.006
Points Scored	−.024	.026

Note. *SE* = standard error. β is the parameter estimate of Refs Height in a regression of Table 4, Specification 3 on the respective dependent variable. Dependent variables represent the number of occurrences per 48 min. All standard errors are White corrected.
***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

impact on points scored may be due to a substitution effect, as better scorers go to the bench in foul trouble and are replaced with less productive scorers.[8]

Although the increase in foul calls associated with shorter referee crews is statistically significant and perhaps economically significant in its impact on foul trouble and free throw shooting, there is little evidence to suggest other game outcomes are affected. Since player heights do not play a role in referee height bias, each team would be treated equally in this regard. Thus, no team would garner an advantage for winning purposes, nor would gamblers appear to garner an advantage for money line and point spread wagering purposes. In contrast, now that the NBA started (in 2008) releasing its referee assignments at 9:00 a.m. on the morning of each game as a postscandal corrective measure to remove the market for inside information, bettors may be able to garner an advantage on totals (overall number of points scored by both teams) or prop bets related to the over/under on the number of personal fouls, the number of free throws made or attempted, or the elapsed time of the game. However, we are not presently aware of any existing prop bets of this nature being widely available.

Conclusion

Height-related biases in decision making may encompass many areas of life and economic activity. In this article, we study height bias in the fast-paced, high-pressure, heavily monitored, nonexperimental setting of the NBA referee's workplace. We

find evidence that referees exhibit height-related bias in their personal foul calls in a manner resembling the Napoleon Complex. We also find that increased foul calling by shorter referee crews does not vary with player height. This finding may be true in an absolute sense or it may be a function of our sample, which does not contain a substantial number of players who are shorter than the referee crew.

One limitation of our study warrants discussion. One could argue that shorter referees have a different position-related vantage point than taller referees and therefore tend to call more fouls in a manner that we cannot control in our analyses (Mallo et al., 2012; Pizzera & Raub, 2012). We believe that this different vantage point could just as easily predispose a shorter referee crew to whistle fewer fouls as opposed to more fouls. Additionally, a referee's vantage point changes by a matter of inches just by running up and down the court. It seems implausible that running or jogging would change a vantage point in a meaningful manner. Finally, this may be testable by examining the relationship between referee crew height and technical foul calls.[9] One's height vantage point should play no role in technical foul calls but aggressive, controlling behavior via the Napoleon Complex may. Thus, finding a similar relationship between referee crew heights and technical foul calls would support our current findings and contradict any argument about height vantage points. This is beyond the scope of the current article but is a meaningful avenue for future research.

This research is important to sports industry operations, as it touches upon credibility and integrity issues that are often the focus of the media (Abbott, 2010), the recent sports gambling litigation in New Jersey (Rodenberg & Kaburakis, 2013), and the efficiency of betting markets (Larson, Price, & Wolfers, 2008). Bias by workplace evaluators, even bias of the implicit nature evidenced here, can cause problematic perceptions (Adande, 2008; Stein, 2008) and important integrity issues central to the evaluation of firm personnel. However, emerging evidence shows that awareness of such subconscious biases can result in corrective measures (Pope et al., 2013). Perceptions of bias and certain on-court behavior among sports officials, who are supposed to be neutral evaluators of workplace conduct, have occasionally resulted in suspensions (Borden, 2012; Stein, 2003), consternation among sports league administrators charged with maintaining game integrity and public opinion (Abbott, 2010; Price & Wolfers, 2012), and coaches and team owners who have voiced criticism of on-court officials (Dupree, 2006). Such issues are worthy of inquiry.

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Notes

1. We are aware that the oft-used phrase "Napoleon Complex" may be a misnomer from history (British Broadcasting Corparation, 2009) but retain the phrase here, given its contemporary use.
2. Since a Napoleon Complex is posited to be a male behavioral phenomenon, we exclude observations in which a female official, Violet Palmer, was a part of the referee crew (3,407 player-games). We also exclude games officiated by Steve Anderson, Scott Bolnick, Sir Allen Conner, Matt Myers, and Ben Taylor (169, 345, 181, 182, and 196 player-games, respectively) since, as nonstaff officials, information on their personal characteristics was not contained in the annual National Basketball Association (NBA) Officials Media Guide.
3. See National Basket ball Association (2008, 2009, 2010, 2011, and 2012). The 2012-2013 NBA Officials Media Guide was used to obtain characteristic information for Kevin Scott.
4. For a robustness check, the inner range of referee crew average heights was contracted by both half an inch and one inch. Personal Fouls, Free Throws Made, and Free Throws Attempted followed the same pattern.
5. Price and Wolfers (2010) were interested in the interaction of referee race and player race. Our interest is the interaction of referee height and player height.
6. A negative parameter estimate supports our hypothesis since referee crew height is assumed to increase on the margin.
7. By not controlling for referee fixed effects, unobservable referee characteristics could impact the results. We included as many observable referee characteristics as possible in an attempt to control for most behavior-affecting factors. Any remaining unobservable characteristics that are related to height, such as foul-calling philosophy, may very well be part of the psychological factors that makeup the so-called Napoleon Complex.
8. We conjecture that the substitution effect is on the margin, where players who score more points and play more minutes are more likely to be in foul trouble and therefore more likely to be benched if a referee crew has a higher foul calling rate.
9. Kendall (2008) analyzed technical fouls in the context of the NBA.

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Author Biographies

Paul Gift is an associate professor of economics at Pepperdine University, Graziadio School of Business and Management.

Ryan M. Rodenberg is an assistant professor of sports law analytics at Florida State University.