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A novel bias in managers' allocation of bonuses to teams: Emphasis on team size instead of team contribution

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Abstract

How should managers supervising multiple teams allocate bonuses-based on each team's size or based on each team's contribution? According to the commonly accepted equity norm for allocating rewards, managers should distribute bonuses based on the relative contributions of the team. In contrast, we propose that managers are instead distracted by the number of employees in each team and neglect team contribution highlighted in the equity norm. Pilot Studies 1 and 2 confirmed that in both individual- and team-based bonus allocation situations, people preferred and actually allocated rewards according to the equity norm rather than the equality norm or the need norm when only contribution was manipulated. However, Study 1, a laboratory experiment, revealed that individuals assigned to the role of a manager allocated more bonuses to the larger team even though the two teams' actual work output (in terms of the number of units of work completed) was nearly identical. Study 2 replicated the key findings of Study 1 using a sample of managers supervising teams in organizations. Study 3 developed an information nudgehighlighting the team contribution-that reduced this bias. Together, these studies indicate a novel team-size bias that creeps in when managers allocate rewards to multiple teams and document an information nudge to reduce this bias.

KEYWORDS

bonus, decision-making bias, equity norm, rewards, team

INTRODUCTION 1

One of the key goals of managers is to motivate employees to perform well (Garbers & Konradt, 2014). Managers often do so by providing financial incentives such as performance bonuses to employees (for a review, see Govindarajulu & Daily, 2004). Given the growing prevalence of teamwork in enterprises (Kozlowski & Ilgen, 2006), team-based bonuses (i.e., bonuses allocated to teams) have become more prevalent (Rynes & Bono, 2000). Indeed, a meta-analysis found that team-based bonuses are more effective at motivating employees than individual-based bonuses (Condly et al., 2003). However, the majority of research examining bonus allocations in team settings has focused on how best to

allocate bonuses to individual team members within a team (e.g., Bamberger & Levi, 2009; Chen & Church, 1993), which technically is still individual-based bonus allocation.

The distributive justice literature has discussed three common allocation norms-the equity norm, the equality norm, and the need norm (e.g., Deutsch, 1973, 1985; Leventhal, 1976). The equity norm refers to proportionally allocating bonuses based on employees' relative contributions; the equality norm refers to allocating an equal bonus to all employees, and the need norm refers to allocating bonuses based on employees' needs. According to equity theory, rewards should be allocated based on individuals' contributions so that the contribution-to-reward ratio for each individual is the same (Adams, 1965; Adams & Freedman, 1976; Leventhal, 1976). Past

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research on reward allocations has shown that employees view equitable allocation as fairer than equal allocation, which disregards individuals' contributions (e.g., Deutsch, 1973, 1985; Lawler, 1971; Leventhal, 1976; Meindl, 1989). In addition, a meta-analysis found that when rewards are allocated to individual team members, equitable allocation boosts employees' performance more than equal allocation (Garbers & Konradt, 2014). Therefore, we anticipate that when allocating bonuses to teams, people would favor the equity norm above the equality and need norms.

Although past research has advanced our understanding of bonus allocation norms, this work has exclusively focused on individualbased bonus allocation situations (e.g., Chen, 1995; Hysom & Fisek, 2010). Thus, we know little about the bonus allocation norms within team situations. As teams become the primary work units in organizations (Tjosvold et al., 2003), managers will be entrusted with allocating bonuses to multiple teams. In this case, before allocating bonuses to individual team members, managers should first allocate a bonus quantum to each team. Imagine that at an advertising agency. the department supervisor needs to distribute a quantum of bonus amongst two teams working under them in the same territory and tasked with pitching for business from two prospective clients, respectively. Both prospective clients were comparable in prestige and business worth. In both circumstances, the likelihood of a successful pitch was equivalent. If both teams were equally productive on a per-capita basis, then proportionally allocating the bonus quantum based on team size would be an equitable allocation. However, what if one team had a much greater per-capita output than the other? In such situation, despite the fact that both teams successfully pitched for their respective clients, varied team sizes imply greater per-capita output for the smaller team compared to the larger team. Consequently, allocating the bonus quantum based on team size would result in members of the smaller team receiving a smaller average bonus amount than those of the larger team. In contrast, according to the equity norm, equally productive teams should receive an equal bonus quantum, ensuring that members of the smaller team (which had greater per-capita output) receive proportionally higher bonuses than those of the larger team

Unlike in individual-based bonus allocation situations, in teambased bonus allocation situations, two types of contributions can be considered when allocating bonuses: team total contribution and average team member contribution (which demonstrates how one team outperforms the other on a per-capita basis). In fact, allocating bonuses across teams based either on team total contribution or average team member contribution will lead to the same result. For instance, two teams are of different sizes (e.g., 2 vs. 4), yet each contributed equally to the organization. The smaller team achieves the same contribution as the larger team with fewer members, indicating that the average team member contribution of the smaller team is greater than that of the larger team. If we allocate bonuses to the two teams based on team total contribution, then the bonus allocated to each team should be equal, and members of the smaller team would receive twice as much bonus as those of the larger team. If bonuses are allocated across two teams based on average team contribution (team total contribution/team size), members of the smaller team should receive, on average, twice as many bonuses as members of the larger team based on per-capita productivity, again resulting in even bonuses across two teams.

Although there are multiple reasons for choosing an equitable allocation, decision makers often fail to allocate rewards equitably (Korte, 2003), possibly due to two different decision-making biases: denominator neglect (also known as base-rate neglect) and conservatism (Achtziger et al., 2014). A classic example of base-rate neglect is that people choose a 7/100 chance of winning over a 1/10 chance of winning despite the fact that the 1/10 chance of winning is clearly greater than the 7/100 chance of winning (Chui et al., 2021; Reyna & Brainerd, 2008). However, this bias is not applicable in our case. Based on the equity norm, the bonus should be allocated based on the ratio of the team's contribution to the organization. Therefore, when allocating bonuses to team j, the equity norm prescribes the following formula:

$Bonus_{j} = TotalBonusAmount \times (Contribution_{j}/TotalContributionAcrossAllTeams) \eqno(1)$

Denominator neglect could have come into play if we specified the dollar amount of each team's contribution; however, our studies specified the percentage of each team's contribution over the total contribution, thereby directly incorporating the denominator in the information provided.

A more relevant bias is the conservatism bias (Edwards, 1968), which states that decision makers overweight prior information (i.e., team size in our case) and ignore or undervalue new information (i.e., team contribution in our case) (Achtziger et al., 2014). If no information regarding team contribution is available, team size may be a suitable criterion for dividing bonuses. However, when team contribution is available, it serves as the primary criterion for bonus allocation based on the equity norm. Nevertheless, when team contribution is provided, managers who fall into the conservatism trap are likely to place too much emphasis on team size while ignoring team contribution. Therefore, they mainly consider the ratio of team size, thereby allocating bonuses based on the equation:

$Bonus_i = TotalBonusAmount \times (Size_i/TotalSizeAcrossAllTeams)$ (2)

In this circumstance, managers violate the equity norm because they are not taking teams' contributions into account. To rectify this bias, we need to make the team contribution salient, for example, by emphasizing per-capita productivity (i.e., average team member contribution). Based on the above arguments, we hypothesize that when allocating bonuses to teams that contributed equally, people would allocate more bonuses to the larger team than to the smaller team. We test this hypothesis using a set of online and lab experiments and test an intervention to reduce this bias.

Our research seeks to make several contributions to the literature. First, we are among the first to investigate how individuals allocate bonuses to teams, thus expanding the bonus allocation literature (e.g., Bamberger & Levi, 2009; Garbers & Konradt, 2014) beyond the within-team context to the between-team context. Second, we contribute to the distributive justice literature (e.g., Barber & Simmering, 2002; Cohen-Charash & Spector, 2001; Sherf et al., 2019) by identifying team size as a key element that causes managers to deviate from the equity norm when allocating bonuses to teams. Third, we contribute to the managerial decisionmaking literature (e.g., Dane & Pratt, 2007; Salas et al., 2010; Zeni et al., 2016) by investigating how the decision context (i.e., allocation of rewards to individuals versus teams) affects managers' bonus allocation decisions. Finally, we develop an information nudge to reduce this bias in team-based bonus allocation decisions, which provides managers with an efficient and low-cost method for making more rational bonus allocation decisions in the team context, thereby at least maintaining, if not increasing, team motivation and productivity.

2 | OVERVIEW OF STUDIES

We conducted five studies to test our hypothesis. First, Pilot Study 1 tested our assumption that people believe that the equity norm is fairer than the equality norm in both individual- and team-based bonus allocation contexts. Pilot Study 2 tested whether people indeed follow the equity norm when being asked to allocate bonuses in both individual- and team-based bonus allocation contexts. Study 1 tested our hypothesis using a lab experiment in which students played a managerial role and were asked to allocate bonuses to multiple teams working under them. Study 2 sought to replicate the finding using a sample of managers supervising teams in organizations. Finally, Study 3 examined whether an information nudge that explicitly states the average team member contribution of each team enhances the likelihood that managers will allocate bonuses based on the team's contribution rather than the team's size. All surveys were posted on Amazon Mechanical Turk (Mturk). Mturk provided a suitable sample source for us as participants recruited from this platform are diverse in terms of nationality, age, education, etc., and researchers usually get consistent results from Mtruk samples as from traditional samples (e.g., employee or student samples) (Buhrmester et al., 2016; Yuan et al., 2018). A recent meta-analysis indicated that online panels such as Mturk are of comparable quality to conventional data collection sources (Walter et al., 2016). In our data collection from Mturk, we set up several prerequisites to ensure the high quality of our sample: (1) participants were required to possess a minimum of a 95% approval rating and have completed at least 100 tasks; (2) Mturk automatically excluded participants whose IP addresses were outside the US; (3) Qualtrics blocked multiple submissions from the same computer; and (4) participants had to pass a captcha test. Across all studies, we report all participants, conditions, and measures. Survey materials, data, and code related

to this article are available at https://osf.io/j38cn/?view_only=9af602d581b7405bb19aa7dc4f19060e.

3 | PILOT STUDY 1

This study tested our assumption that people perceive the equity norm as fairer than the equality and need norms in both individualand team-based bonus allocation contexts.

3.1 | Method

3.1.1 | Participants

As this was the first study that employed this manipulation, we did not have a basis for conducting a power analysis. We thus assumed a medium effect size of d = .40 (Funder & Ozer, 2019). A power analysis with d = .40 (main effect), $\alpha = .05$ (two-tailed), and power = 80% indicated that we need to recruit 100 participants per condition. Thus, a survey seeking 200 U.S. respondents was posted on Mturk. In response, 213 participants¹ completed the study (51.6% women, 47.9% men, 0.5% other; $M_{age} = 38$ years, $SD_{age} = 11.90$; 63.7% with a bachelor's or above degree, 1 missing).

3.1.2 | Procedure

Participants were randomly assigned to one of two conditions: individual-based bonus allocation and team-based bonus allocation. In the team-based bonus allocation condition, participants were presented with the scenario that they were a director at HiTec Inc. and had been supervising two teams, Team A and Team B. Team A contributed 25% to the organization's profit, whereas Team B contributed 75%. Then participants were informed that the CEO gave them \$100,000 to distribute across two teams as a reward. After reading the scenario, participants were asked to choose:

"Which one of the following three bonus allocation rules do you think is the best?

(a) Allocate an equal amount of bonus to each team (Team A: \$50,000; Team B: \$50,000).

(b) Proportionally allocate the bonus based on each team's contribution (Team A: \$25,000; Team B: \$75,000).(c) Allocate bonus based on each team's needs."

In the individual-based bonus allocation condition, the word "team" was changed into "employee." Please see the supporting information for detailed manipulation.

¹A sensitivity analysis based on the actual sample size of 213, $\alpha = .05$ (two-tailed), and power = 80% yielded an effect size of d = .39.



FIGURE 1 Percentage of participants preferring each bonus allocation norm (Pilot Study 1).

3.2 | Results

We found that 75.7% of participants in the individual condition and 69.8% in the team condition preferred the equity norm; 22.4% in the individual condition and 19.8% in the team condition preferred the equality norm; only 1.9% in the individual condition and 10.4% in the team condition preferred the need norm (see Figure 1). A 2 (individual-based bonus allocation condition vs. team-based bonus allocation condition) \times 3 (equity norm vs. equality norm vs. need norm) Chi-square test of independence revealed that there was a significant difference between individual-based and team-based bonus allocation conditions regarding three distributive norms, $\chi^2(2) = 6.74$, p = .034, which appeared to be driven by the greater emphasis on the need norm in the team-based bonus allocation condition. However, given the general low emphasis on the need norm, we do not discuss it further. If we focus on just the equity norm and the equality norm, we find no significant differences by conditions, $\chi^2(1) = .02$, p = .899.

3.3 | Discussion

The findings of Pilot Study 1 were consistent with those of previous research (e.g., Deutsch, 1973, 1985; Lawler, 1971; Leventhal, 1976; Meindl, 1989), which revealed that people favor the equity norm when distributing bonuses. These findings thus verify that our assumption holds even with respect to team bonus allocation. The findings imply that people believe that teams that made a bigger contribution should receive more bonuses. In Pilot Study 1, we asked people to choose the best allocation norm rather than examining their actual allocation decisions. It is likely that though people prefer the equity norm, they make allocation decisions based on other norms. Therefore, we conducted Pilot Study 2 to test this possibility.

4 | PILOT STUDY 2

Building on Pilot Study 1, Pilot Study 2 tested whether people follow the equity norm when making bonus allocation decisions in both individual- and team-based contexts. We included four conditions in a 2 (individuals vs. teams) \times 2 (equal vs. unequal contributions). In the team conditions, we stated that both teams were of the same size. The equity norm would predict that in the unequal contribution conditions, people would allocate a greater bonus to the employee/team with higher contribution compared to in equal contribution conditions. If this is true, then we can surmise that people indeed allocate bonuses based on the equity norm in both individual- and team-based bonus allocation conditions.

4.1 | Method

4.1.1 | Participants

As this is the first study that employed this manipulation, we did not have a basis for conducting a power analysis. We thus assumed a medium effect size of f = .15. A power analysis with f = .15 (interaction effect), $\alpha = .05$ (two-tailed), power = 80%, numerator df = 1, number of groups = 4, and number of covariates = 0 indicated that we need to recruit 351 participants. Rounding up this number, we posted a survey seeking 400 US respondents on Mturk. In response, 404 participants² completed the study (49.6% women, 50.1% men, and 0.2% other, 3 missing; $M_{age} = 42.84$ years, $SD_{age} = 12.25$, 18 missing; and 69.0% with a bachelor or above degree, 1 missing).

²A sensitivity analysis based on the actual sample size of 404, $\alpha = .05$ (two-tailed), and power = 80%, numerator *df* = 1, number of groups = 4, and number of covariates = 0 yielded an effect size of *f* = .14.

4.1.2 | Procedure

Participants were randomly assigned to one cell of a 2 (individualbased vs. team-based bonus allocation) \times 2 (equal contribution vs. unequal contribution) design. In the equal contribution condition, both entities contributed 50%, and in the unequal contribution condition, Employee A/ Team A contributed 25%, and Employee B/Team B contributed 75%. In the team condition, participants were informed that both teams had 5 team members. Participants were asked to distribute \$100,000 across the two entities. Please see the supporting information for the detailed manipulation.

4.2 | Results

We submitted the bonus allocated to Employee B/Team B (the higher-contribution employee/team in the unequal contribution condition) to a 2×2 ANOVA. We found a significant main effect of the contribution manipulation, F(1, 400) = 744.96, p < .001, $\eta^2 = .65$. Specifically, Employee B/Team B received more bonus in the unequal contribution condition (M =\$69,703.89, SD =10,004.80, 95% CI = [68,173.45, 71,141.92]) than in the equal contribution condition (M = \$50,241.55, SD = 2113.78, 95% CI = [50,000.00, 50,579.10]),t(402) = 27.34, p < .001, Cohen's d = 2.72. There was no main effect of the individual vs. team manipulation, F(1, 400) = .002, p = .969, $n^2 = .00$. That is, Team B/Employee B received almost the same amount of bonus in the individual-based (M =\$59.705.88. SD = 12,102.26, 95% CI = [57,941.80, 61,420.95]) and the team-based condition (M = \$59,758.34, SD = 12,083.83, 95% CI = [58.033.34, 61.391.67], t(402) = .04, p = .965. Cohen's d = .004. Finally, the interaction of individual vs. team \times equal vs. unequal contribution conditions was not significant, F(1, 400) = .40, p = .530, $\eta^2 = .001$ (see Figure 2).

70000

60000

50000

40000

30000

10000

The amount of allocated bonus

4.3 | Discussion

Consistent with Pilot Study 1, Pilot Study 2 found that people indeed followed the equity norm when distributing bonuses in both individual- and team-based bonus allocation contexts when both teams were of equal size. In an individual-based bonus allocation context, people allocated nearly the same bonus to two equally contributing employees, but a larger bonus to the employee with the greater contribution. We also found similar results in the team-based bonus allocation context. The key question is, do people violate the equity norm when teams are of different sizes?

5 | STUDY 1

Study 1 tested our hypothesis that when teams differ in size, people deviate from the equity norm, using a lab experiment in which participants supervised multiple teams working on a specific task. The teams' collective performance would determine participants' bonuses. Study 1 asked participants to allocate a bonus to each team member. We tested whether the sum of bonuses allocated to each team would violate the equity norm.

5.1 | Method

5.1.1 | Participants

As this is the first study that employed this manipulation, we did not have a basis for conducting a power analysis. We thus assumed a medium effect size of d = .40 (Funder & Ozer, 2019). A power analysis with d = .40 (main effect), $\alpha = .05$ (two-tailed), and power = 80% indicated that we need to recruit 100 participants per condition. Thus,

□Employee A / Team A

Employee B / Team B



FIGURE 2 Mean bonus allocation in both team- and individual-based bonus allocation (Pilot Study 2). In the unequal contribution condition, employee A/team A contributed 25% and employee B/team B contributed 75% to the company's increase in sales.

we decided to recruit 200 participants. Our study design required that each session involve exactly seven participants; if fewer than seven participants showed up for a session, they were assigned to participate in other studies. We managed to recruit 203 participants who are undergraduate students at a large university in Singapore and dropped 16 participants that did not complete the survey, yielding 187 participants³ for analysis (53.7% women, 46.2% men, 14 missing; $M_{age} = 20.46$ years, $SD_{age} = 1.55$, 14 missing).

5.1.2 | Procedure

Seven students participated at a time in a single room. They were seated in seven private cubicles and completed the study on a computer. Participants were informed that the computer would select one out of seven students to be the leader, and the other six students to be employees. Unbeknownst to participants, all students were actually asked to play the leader role. Participants were randomly assigned to either the equal team size condition or the unequal team size condition. Participants were informed: "You are assigned the role of the team leader. As a leader, you will supervise two teams who will work on a task: Team A with 2 members and Team B with 4 members (Team A with 3 members and Team B with 3 members)." The information that varied across conditions is presented in parentheses.

Participants were then informed that the two teams would be working on a different set of 50 remote associates test questions (see an example below; Taft & Rossiter, 1966) in the next 4 min. Participants were presented with three sample remotes associates questions. To emphasize their role as a team leader, we asked participants to type out instructions about how their subordinates would solve the task, which purportedly would be transmitted to the subordinate. After 4 min, participants were informed that the two teams correctly solved a very similar number of questions—Team A got 30 questions correctly, Team B got 31 questions correctly, and all team members contributed equally to the team's performance. Participants were then presented to distribute 120 bonus points among team members of the two teams. They were asked to type out the points to allocate to each team member, which must all add up to 120. Please see the supporting information for detailed manipulation.

Example 1. What word is related to these three words? "paint; doll; cat." The answer is "house": house paint, dollhouse, and house cat.

5.2 | Results

We summed up the bonus points that participants allocated to all members within each team. In the *equal team size condition*, Team A, which solved 30 questions correctly, received slightly fewer bonus points (M = 58.34, SD = 5.77, 95% CI = [57.10, 59.41]) than Team B, which solved 31 questions correctly (M = 61.66, SD = 5.77, 95% CI = [60.59, 62.90]), t(91) = 2.76, p = .007, Cohen's d = 0.29. In the *unequal team size condition*, the smaller Team A received fewer bonus points (M = 45.52, SD = 13.02, 95% CI = [43.01, 48.23]) than the larger Team B (M = 74.48, SD = 13.02, 95% CI = [71.77, 77.00]), t (94) = 10.84, p < .001, Cohen's d = 1.11. A t-test comparing the bonus points allocated to Team A across conditions indicated that Team A received fewer bonus points in the *unequal team size condition*, t(185) = 8.657, p < .001, Cohen's d = 1.27, despite the case that Team A's performance was identical in both conditions at 30 correctly solved questions (see Figure 3).

5.3 | Discussion

Study 1 used a laboratory experiment in which student participants allocated bonuses to individual team members of two teams working under them. To enhance the reality of the scenario, instead of setting up a totally equal team contribution, we informed participants that Team A (with two members) correctly answered 30 RAT questions and Team B (with four members) correctly answered 31 RAT questions. As the contributions of these two teams are nearly equal, the equity norm prescribes that each team should receive a similar amount of bonus (i.e., about 60 points). In the unequal team size condition, this means that each member of the smaller team should receive a bonus of 30 points (60/2), whereas each member of the larger team should receive a bonus of 15 points (60/4). However, we found that people allocated much more bonuses to the larger team (74.48 points) than to the smaller team (45.52 points), which meant that each member in the smaller team received 22.76 points, whereas those in the larger team received 18.62 points. Thus, on average, members of the larger team performed worse than members of the smaller team but received more bonuses than they deserved.

6 | STUDY 2

Study 1 tested our hypothesis by asking a student sample to allocate bonuses to each team member. To assess the generalizability of our findings, Study 2 tested whether our findings could be replicated in an organizational context with a sample of managers supervising teams who were asked to directly allocate bonuses to teams.

6.1 | Method

6.1.1 | Participants

A power analysis with d = .30 (main effect), $\alpha = .05$ (two-tailed), and power = 80% indicated that we need to recruit 90 participants. We rounded up this number to 100 participants and posted a survey seeking 100 participants on Mturk. Using three prescreen questions:

³A sensitivity analysis based on the actual sample size of 187, $\alpha = .05$ (two-tailed), and power = 80% yielded an effect size of d = .41.

FIGURE 3 Mean bonus allocated to each team (Study 1). In the unequal team size condition, team A had two team members, whereas team B had four team members. In the equal team size, both team A and team B had three team members.



(1) current work status, (2) manager or not, and (3) the number of subordinates supervised, we successfully recruited 100 full-time managers⁴ at work that have at least three subordinates working under them from Mturk (32% women, 68% men; $M_{age} = 40.96$ years, $SD_{age} = 10.84$, 5 missing; and 75% with a bachelor's or above degree).

6.1.2 | Procedure

The procedure was similar to that of Pilot Study 2, except that we used a within-participant design-participants were presented with both the equal team size condition (both Team A and Team B had six members), and the unequal team size condition (Team A had four members whereas Team B had eight members). These two conditions were counterbalanced. Participants were asked to imagine that they are the Director of Research and Development at HiTech Inc. and have been supervising two product development teams in the past 3 years. In order to prevent contamination of the criteria for team contribution, we stressed in the scenario description that "Each team developed a new product after overcoming similar challenges. The likelihood of successfully developing two products was the same. Further, each new product was developed for a market segment with similar sales and profit potential." Participants were asked, "How would you distribute the \$120,000 bonus across the two teams?" after reading each scenario. Participants were presented with response boxes in which they needed to type the amount of bonus they would like to allocate to each team; the total was required to add up to \$120,000. Then, participants were asked, "Please explain your allocation decisions. That is, why did you allocate the bonus in this manner across the two teams?" We also used this question as our attention-check question. We excluded participants who provided gibberish or irrelevant responses from our analyses (please see the supporting information for the detailed manipulation and the deleted gibberish or irrelevant responses).

6.2 | Results

Team A received almost the same amount of bonus (M = \$60,050, SD = 500, 95% CI = [60,000, 60,150]) as Team B (M = \$59,950, SD = 500, 95% CI = [59,850, 60,000]), t(99) = 1.00, p = .320, Cohen's d = .10. However, in the unequal team size condition, the smaller Team A received fewer bonuses (M = \$49,810, SD = 10,907.04, 95% CI = [47,760, 52,148.98]) than the larger Team B (M = \$70,190, SD = 10,907.04, 95% CI = [67,851.02, 72,240]), t (99) = -9.34, p < .001, Cohen's d = .93 (see Figure 4).

6.3 | Supplementary analysis

To shed light on what participants are thinking when they make their allocations, after participants made allocation decisions, we asked them to explain their decisions. Three authors independently coded the qualitative data. First, two authors coded the textual responses separately without reference to the actual decisions. Then, these two authors worked together to resolve the discrepancies during the coding process and left the unsolved discrepancies for the third author to review and reach a final agreement. We found that in the unequal team size condition, participants focused less on "contribution to profits" (45%) and "fairness" (17%), as compared to 59% and 26%, respectively, in the equal team size condition; however, participants focused more on "number of members" in the unequal team size condition (36%) than in the equal team size condition (15%). Taken together, these results suggest that participants in the equal team size condition were more likely to allocate equal bonuses across two teams as they focused more on "contribution to profits" (team contribution). However, participants in the unequal team size condition focused more on individual team members, resulting in more bonuses allocated to the larger team. Thus, these qualitative results are consistent with our empirical results that individuals focus on team contribution to allocate bonuses in the equal team size condition, whereas they focus more on team size instead of team contribution in the unequal team size condition, thereby violating the equity norm. For detailed coding

⁴A sensitivity analysis based on the actual sample size of 100, $\alpha = .05$ (two-tailed), and power = 80% yielded an effect size of d = .28.



FIGURE 4 Mean bonus allocated to each team (Study 2). In the unequal team size condition, team A had four team members, whereas team B had eight team members. In the equal team size condition, both team A and team B had six team members.

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procedures and results, please refer to the document: https://osf.io/ j38cn/?view_only=9af602d581b7405bb19aa7dc4f19060e.

6.4 | Discussion

Study 2 replicated the findings of Study 1 using a within-participant design with a manager sample. In both conditions, participants were informed that each team contributed 50% to the company's increase in sales. Thus, the equity norm prescribed that managers allocate the same bonus (i.e., \$60,000) to each team. This means that in the *unequal team size condition*, team members in the smaller team should receive an average bonus of \$15,000, whereas those in the larger team should receive an average bonus to the larger team (\$49,810). As a consequence, the members of the smaller team received \$12,452.50 on average, whereas those in the larger team received \$8773.75 on average. Thus, even experienced managers do not allocate rewards based on the equity norm.

7 | STUDY 3

We proposed that people violate the equity norm when allocating bonuses to teams because they place too much emphasis on team size while ignoring the most critical factor of the equity norm—the teams' contribution. To overcome such a bias, Study 3 tested an information nudge that emphasizes team members' average contribution (i.e., explicitly specifying the extent to which each team member has contributed to the organization). We reasoned that people do not intentionally choose to under-reward members of high-performing but smaller teams and over-reward those of low-performing but larger teams; instead, when people are allocating bonuses to teams, the contribution of individual members is not salient; only the teams' size and contributions are salient. We expected that people would be more likely to distribute bonuses based on the equity norm if they were aware of the average team member contribution, which is another significant and prominent approach to demonstrating team contributions.

7.1 | Method

7.1.1 | Participants

Similar to Pilot Study 2, a power analysis with f = .15 (interaction effect), $\alpha = .05$ (two-tailed), power = 80%, numerator df = 1, number of groups = 4, and number of covariates = 0 indicated that we needed to recruit 351 participants. Rounding up this number, a survey seeking 400 U.S. respondents was posted on Mturk. Survey was posted on Mturk, and we finally obtained 400 complete responses⁵ (46.3% women, 53.5% men, 0.3% others; $M_{age} = 40.81$ years, $SD_{age} = 10.74$, 5 missing; 69.6% with a bachelor's or above degree).

7.1.2 | Procedure

The procedure was consistent with Pilot Study 2, except that participants were randomly assigned to one cell of a 2 (equal team size vs. unequal team size) \times 2 (with information nudge vs. without information nudge) conditions. In the *equal team size condition*, both Team A and Team B had 6 team members; in the *unequal team size condition*, they were 4 and 8 for Team A and Team B, respectively. In both conditions, the teams' contributions to the organizational increase in sales were the same (i.e., 50% vs. 50%). In the *without information nudge condition*, as in previous studies, participants were not provided with the information about the team members' average contribution to each team. In the *equal team size with information nudge condition*, we provided participants with the information: "The average contribution

⁵A sensitivity analysis based on the actual sample size of 404, $\alpha = .05$ (two-tailed), and power = 80%, numerator df = 1, number of groups = 4, and number of covariates = 0 yielded an effect size of f = .14.

of each member in Team A/B is 8.33%; the average contribution of each member of Team A is the same as the average contribution of each member of Team B." And in the unequal team size with information condition, we provided participants with the following information: "The average contribution of each member in Team A is 12.5%; the average contribution of each member in Team B is 6.25%; the average contribution of each member of Team A is 2 times more than the average contribution of each member of Team B." After they read the scenario, participants were presented with response boxes in which they needed to type out the amount of bonus they would like to allocate to each team and each team member, both of which were required to add up to \$120,000. Then, they were asked, "Please explain your allocation decisions. That is, why did you allocate the bonus in this manner across the two teams?" We also used this guestion as our attention-check question. We excluded participants who provided gibberish or irrelevant responses from our analyses (please see the supporting information for the detailed manipulation and the deleted gibberish and irrelevant responses).

7.2 | Results

We submitted the bonus allocated to Team B (the larger team in the unequal team size condition) to a 2×2 ANOVA. If people were distracted by team size when allocating bonuses to teams, then we should observe a significant main effect of the equal versus unequal team size manipulation as in previous studies. If the information nudge by emphasizing average team members' contributions can overcome such bias, then we should also observe a significant main effect of without information nudge vs. with information nudge manipulation. Similar to Studies 1, and 2, we found a significant main effect of team size, F (1, 396) = 22.72, p < .001, $\eta^2 = .05$. Specifically, Team B (larger team in the unequal team size condition) received more bonuses in the unequal team size condition (M =\$64,409.95, SD = 13,853.66, 95% CI = [62,437.39, 66,312.20]) than in the equal team size condition (M = \$59,924.62, SD = 790.95, 95% CI = [59,791.69, 60,000.00]), t(398) = 4.56, p < .001, Cohen's d = .46. We also found a significant main effect of information nudge, F (1, 396) = 18.50, p < .001, $\eta^2 = .05$. Team B received significantly fewer bonuses in the information nudge condition (M =\$60,144.12, SD = 10,367.75, 95% CI = [58,705.06, 61,521.92]) than in the no information nudge condition (M =\$ 64,295.92, SD =9330.63, 95% CI = [63,057.15, 65,596.56]), t(398) = 4.20, p < .001, Cohen'sd = .42. The 2 \times 2 interaction was significant, F (1, 396) = 17.20, p < .001, $\eta^2 = .04$. We then proceed to test the simple effect of our interaction. We found that when there was no information nudge provided, the effect of team size on the amount of bonuses allocated to the larger team (Team B) was significant (F (1, 396) = 35.89, p < .001, η^2 = .08). However, when there was an information nudge provided, the effect of team size on the amount of bonuses allocated to the larger team was nonsignificant (F (1, 396) = .01, p = .913, $\eta^2 = .00$).

We further conducted a paired sample *t*-test within each condition to examine whether participants allocated more bonuses to one

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team than the other. First, in the *equal team size without information nudge condition*, Team A received the same amount of bonus (M =\$60,000.00, SD = .00, 95% CI = [60,000.00, 60,000.00]) as Team B (M = \$60,000.00, SD = .00, 95% CI = [60,000.00, 60,000.00]). Similarly, in the *equal team size with information nudge condition*, which denoted the average team member contribution of Team A was the same as that of Team B, Team A (M = \$60,145.63, SD = 1097.30, 95% CI = [60,000.00, 60,388.35]) received almost the same bonus as Team B (M = \$59,854.37, SD = 1097.30, 95% CI = [59,611.65, 60,000.00]), t(102) = 1.35, p = .181, Cohen's d = .13.

In the unequal team size without information nudge condition, the smaller Team A received fewer bonuses (M = \$51,580, SD = 11679.37, 95% CI = [49140.25, 53809.49]) than the larger Team B (M = \$68,420, SD = 11679.37, 95% CI = [66190.51, 70859.75]), t(99) = 7.21, p < .001, Cohen's d = .72. Importantly, in the unequal team size with information nudge condition, the smaller Team A received almost the same amount of bonus (M = \$59560.40, SD = 14,724.21, 95% CI = [46,025.63, 51,802.24]) as the larger Team B (M = \$60,439.60, SD = 14,724.21, 95% CI = [56586.7423, 62351.8716]), t(100) = .30, p = .765, Cohen's d = .03. For detailed results, please refer to Figure 5.

7.3 | Supplementary analysis

In Study 3, after participants made allocation decisions, we asked them an open-ended question explaining their decisions. The coding procedures were similar to those in Study 2, and we got similar results in Study 3. Specifically, in both the equal team size and unequal team size conditions, the information nudge increased people's focus on teams' contribution to organizational profits ("contribution to profits"; equal team size without an information nudge = 59.4% versus equal team size with information nudge = 68.9%; unequal team size without information nudge = 40% versus unequal team size with information nudge = 54.7%) and team sizes ("number of members"; equal team size without information nudge = 3.1% versus equal team size with information nudge = 8.7%; unequal team size without information nudge = 17% versus unequal team size with information nudge = 35.6%). These results therefore suggest that the information nudge successfully led people to pay more attention to team contribution along with team size when allocating bonuses. For detailed coding procedures and results, please refer to the document: https://osf. io/j38cn/?view_only=9af602d581b7405bb19aa7dc4f19060e.

7.4 | Discussion

Replicating the findings of Studies 1 and 2, Study 3 found that when people allocate bonuses to teams, they are influenced by the team size. Moreover, only when the team size is equal do people follow the equity norm by allocating nearly the same amount of bonus to both teams with the same contribution, with or without the information nudge provided. However, for the unequal team size condition, only



FIGURE 5 Mean bonus allocated to each team (Study 3). 1. In the equal team size without information nudge condition, both team A and team B had six team members, and participants were not informed of each team's average team member contribution. 2. In the unequal team size without information nudge condition, team A had four team members, whereas team B had eight team members. Participants were not informed of the average team member contribution of each team. 3. In the equal team size with information nudge condition, both team A and team B had six team members, and participants were informed of each team's average team member contribution. 4. In the unequal team size with information nudge condition, team A had four team members, whereas team B had eight team members. Participants were informed of the average team members. Participants were informed of the average team members. Participants were informed of the average team members contribution of each team's average team members. Participants were informed of team size with information nudge condition, team A had four team members, whereas team B had eight team members. Participants were informed of the average team members. Participants were informed of the average team members. Participants were informed of the average team members.

when information about each team's average team member contribution was provided were people able to follow the equity norm when allocating bonuses to teams. In all conditions of Study 3, we prescribed the same contribution from the two teams.

Specifically, in the *equal team size without information* nudge condition, people allocated the same bonus to Team A (\$60,000) and Team B (\$60,000). Thus, the average bonus for each team member in both Team A and Team B was nearly identical. In the *equal team size with information nudge condition*, people were informed that the average team member contribution of Team A was the same as Team B's (i.e., "The average contribution of each member in Team A is 8.33%; the average contribution of each member in Team B is 8.33%. Therefore, the contribution of each member of Team A is the same as the contribution of each member of Team B"). Consequently, people allocated a similar amount of bonus to Team A (\$60,145.63) and Team B (\$59,854.37).

In the *unequal team size without information nudge* condition, according to the equity norm, people should give an identical bonus of \$60,000 to both teams. In this case, the average bonus allocated to individual members of the smaller Team A with four members should have been \$15,000, whereas individual members of the larger Team B with eight members should have been \$7500. However, consistent with previous studies 1 and 2, we found that people allocated \$51,580 to the smaller Team A and \$68,420 to the larger Team B, yielding an average bonus of \$12,895 for each team member in the smaller Team A and \$8552.50 for those in the larger Team B. Thus, although members of the smaller team earned more bonuses on average than those of the larger team, the difference is smaller than that dictated by the equity norm. However, in the *unequal team size with information nudge* condition, by explicitly specifying the average team member contribution of each team, people tended to successfully

allocate bonuses to teams based on the equity norm. Specifically, our findings revealed that with the information nudge, even in the unequal team size condition, the smaller Team A (\$59,560.40) received almost the same bonus as Team B (\$60,439.60), yielding a similar average amount of bonus for each team member. Taken together, Study 3 offered a simple information nudge to help people follow the equity norm and make rational distributive decisions when allocating bonuses to teams.

8 | GENERAL DISCUSSION

Across five studies using responses from online participants, statistically trained students, and experienced organizational managers, this research documented a general biased decision on team-based bonus allocation. Pilot Studies 1 and 2 offer verification for our basic assumption that people endorse the equity norm as fairer than the equality and need norms. People are also able to follow the equity norm in both individual- and team-based bonus allocation contexts when only the contribution level is manipulated. Study 1, a laboratory experiment with statistically trained students, supported our hypothesis that people were misled by team size, thus allocating more bonuses to the larger team than to the smaller team despite the fact that both teams had contributed equally. Study 2 further verifies our hypothesis with a sample of experienced managers from organizations using a within-person design. One step forward, Study 3 finds that when presented with the average team member contribution information, people were inclined to make the rational decision based on the equity norm-allocating a similar amount of bonus to both the smaller team and the larger team when they contributed equally. Taken together, the five studies reveal that, despite a preference for the

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equity norm, people tend to be biased by team size and allocate more bonuses to the larger team regardless of actual team contribution. These findings offer several important implications for management research and practice.

8.1 | Theoretical implications

Our research makes several theoretical contributions to the existing literature. First, our research addresses a key organizational question regarding how people allocate bonuses to teams. Bonus inducement granted for successful performance (Patten, 1977) is a crucial management technique that increases organizational effectiveness by influencing individual and group behaviors (Lawler & Cohen, 1992). Over the last decades, with the emphasis on team-based work (Cohen & Bailey, 1997; Kozlowski & Bell, 2003), team-based rewards have become increasingly important (Rynes & Bono, 2000). However, initial research on team-based bonus allocation has primarily focused on how people allocate bonuses to individual team members within a team and has shown that equitable distribution is beneficial for both employee performance and team effectiveness (Bloom & Michel, 2002; Brown et al., 2003; Farr, 1976; Kepes et al., 2009; Sinclair, 2003). Our study shifts this focus from individual-based bonus allocation within the team context to team-based bonus allocation. Using multiple experiments, we found that though people viewed the equity norm as the most desired way of distribution, their bonus allocation decisions were influenced by team size. Consequently, they allocated more bonuses to the larger team than the smaller team, despite the fact that both teams contributed equally. Our findings revealed that allocating bonuses to multiple teams is not as simple as allocating bonuses to individuals or members of a single team. People's decisions in bonus allocation can be biased by team size, resulting in an inequitable bonus distribution. That is, highperforming members of the smaller team receive proportionally lower rewards than they should, whereas low-performing members of the larger team receive disproportionately higher rewards than they merit. Thus, we extend the current bonus allocation literature by shifting the research focus from individual and within-team contexts to the between-team context and uncovering an important distributive bias in the team-based bonus allocation context.

Second, we contribute to the distributive justice literature (e.g., Cohen-Charash & Spector, 2001; Sherf et al., 2019) by identifying team size as an essential component that misleads managers' decision-making in a team-based bonus allocation context. Distributive justice refers to "the perceived fairness of the amounts of compensation employees receive" (Folger & Konovsky, 1989, p. 115), and it is fostered when "outcomes are consistent with implicit norms for allocation, such as equity or equality" (Colquitt, 2001, p. 386). However, procedural justice is fostered through "voice during a decisionmaking process or influence over the outcome (Thibaut & Walker, 1975) or by adherence to fair process criteria, such as consistency, lack of bias, accuracy, and ethicality (Leventhal, 1980; Leventhal et al., 1980)" (Colquitt, 2001, p. 386). Basically, procedural justice focuses on the justice of the processes that lead to decision results, whereas distributive justice focuses on the justice of decision outcomes themselves (Colquitt, 2001). As the equity norm focuses on whether the distribution of rewards meets the equity criteria, it is a form of distributive justice rather than procedural justice. Plenty of distributive justice research has examined the contingency factors that influence people's perceptions of fairness regarding equity and equality norms. In a review paper, Barber and Simmering (2002) summarized various contingency factors, including gender differences, nationality-based differences, hierarchical level, performance, unionization, types of rewards, and the characteristics of groups. As regards group characteristics, the authors have suggested that task structure, group interdependence, social relationships, and group size can influence people's preferences on the distributive norm. However, they mainly discussed the within-team bonus allocation situation from the perspective of the team members. For example, equitable distribution is favored and effective when team members have independent roles with little interaction (DeMatteo et al., 1998), and egalitarian distribution is favored in large teams (Barber & Simmering, 2002). Our research extends this work by discussing the important role of team size in the between-team bonus allocation situation from the manager's perspective. We found that despite their preference for the equity norm, managers are distracted by team size and distribute more bonuses to the larger team than to the smaller team.

Third, we contribute to the managerial decision-making literature by investigating how people make biased decisions when allocating bonuses to teams. One of the most important and common responsibilities of managers is to make decisions (Zeni et al., 2016). Managerial judgment and decision-making play key roles in human resource development (Korte, 2003) and have been an important area of inquiry (e.g., Kamouri & Balzer, 1990; Kluger et al., 2004; Schweiger et al., 1985; Shanteau & Stewart, 1992; Welsh & Navarro, 2012). Poor decisions harm both the business and the career. Thus, researchers have been examining how our minds function in decision-making processes (Hammond et al., 1998). Despite reducing cognitive and time constraints, there are still biases and fallacies in decision-making (Tversky & Kahneman, 1974). Given that recognizing decision-making biases is beneficial to improving outcomes (Tversky & Kahneman, 1974), identifying specific biased decisions made by managers is critical to increasing management effectiveness. We extend managerial decision-making literature by exploring how individuals make decisions in a team-based bonus allocation context. In particular, we found that managers failed to allocate bonuses equitably to teams because they placed too much emphasis on team size while ignoring team contribution.

Finally, we advance the decision-making literature by providing a useful information nudge to prevent biased bonus allocation decisions. Biases are usually unavoidable (Tversky & Kahneman, 1974). Thus, identifying cognitive strategies to reduce the influence of biases is critical (Zeni et al., 2016). Unfortunately, we know very little about how to correct cognitive biases in judgments and decision-making processes, despite that a great deal of research has been conducted in this area (e.g., Erev & Cohen, 1990; Northcraft & Neale, 1987;

Shanteau & Stewart, 1992; Tversky & Kahneman, 1971). In the present study, we explored the potential managerial bias in the teambased bonus allocation context. Based on a simple yet effective information nudge, we found that people can make rational decisions on team-based bonus allocation when explicitly presented with the information about average team member contributions. Thus, we provide insightful guidance for managerial decision-making processes to prevent managers from making irrational decisions when allocating bonuses to teams.

8.2 | Practical implications

Our research has important implications for managerial practice. Nowadays, organizations achieve success mainly through a team-based strategy. Therefore, teams become the primary work units in organizations (Guzzo & Dickson, 1996). In addition, team-based incentives have become increasingly vital for team effectiveness (McClurg, 2001: Parker et al., 2000). Given that different bonus-allocation rules may affect team effectiveness (DeMatteo et al., 1998), managers need to carefully consider how they allocate bonuses/rewards to teams. However, managers are susceptible to decision biases that result in unsatisfactory outcomes (Kahneman & Tversky, 1979). To avoid being victims of these biases, they would benefit from a heightened awareness of potential biases during bonus allocation (Zeni et al., 2016). Our research is among the first to provide guidance for this important practical problem. We found that managers can be easily distracted by team size and allocate more bonuses to the larger team than the smaller team, even with equal team contributions. However, if presented with the information about average team member contributions, managers are able to make a rational decision following the equity norm. Therefore, our study not only provides the implication that managers' bonus allocation decisions can be biased in the between-team context, but also offers managers an important strategy to avoid such bias. Specifically, we recommend managers consider the total team contribution as the fundamental factor before allocating bonuses to multiple teams. Moreover, they should be aware of the average team member contribution during the decision-making processes instead of focusing on the team size, which is irrelevant information that can lead to a violation of the equity norm.

8.3 | Limitations and future directions

Despite these theoretical and practical implications, our study has potential limitations that hint at promising future research avenues. First, our study did not investigate the potential mechanisms of the studied bias in managers' bonus allocation decisions within the team context, such as consideration of fairness. When allocating bonuses equally regardless of team size, a manager may sense inter-group unfairness. As Leventhal (1976, p. 98) noted, "strict adherence to the rule of equity may cause socioemotional problems by arousing dissatisfaction and resentment." Several alternative mechanisms could also

be at play, including the social environment (e.g., leader-member exchange) and political motivation. For instance, since managers tend to allocate more resources to "in-group" members with high-quality leader-member exchange relationships (LMX; Martinaityte & Sacramento, 2013), it is reasonable to believe that managers would allocate more bonuses to preferred teams regardless of their contribution. In addition, political motivation can also lead to inequitable distribution, for instance, when managers attempt to retain valued employees. In fact, we found that one participant allocated more bonuses to one team than the other, stating that "I wanted to see if team A could outperform team B with fewer resources. If they did, I would fire Team B." Apart from these potential factors, variables such as task difficulty, team members' effort, and the possibility of success can also explain participants' decisions. As these factors are outside the control of employees, they are worth further exploration so that managers can design interventions to reduce their impact on bonus allocation decisions

Second, our study was limited to bonus allocation decisionmaking processes and did not investigate the consequences engendered by the different decisions. That is, how team members perceive the way team bonuses are allocated and their subsequent outcomes. For instance, when employees perceive that rewards have been distributed fairly, they are more engaged with their work, more committed to the organization (Adamovic et al., 2018), have a better relationship with their manager, have higher job performance (Karam et al., 2019), and even exhibit higher team performance (Carter et al., 2018). The opposite outcomes are observed when managers violate the equity norm when allocating bonuses across teams. Future research can examine whether bonus allocations that violate the equity norm have negative downstream consequences for employees' and teams' performance.

Third, our experimental studies modeled team-based bonus allocation using some simplifying assumptions, such as that there are only two teams and that the total bonus amount is generous, while ignoring within-team differences in members' contributions. In reality, team-based bonus allocation decisions are likely more complex. For instance, managers may supervise more than two teams and have limited bonuses to allocate across teams. It is possible that when allocating limited bonuses, managers are more thoughtful and thus less subject to the bias examined in the present research. In addition, our study focused on how managers allocate bonuses across teams; we did not specify how much each team member contributed to the team's output, but specified that all team members contributed equally. In reality, some team members make a bigger contribution than others. Therefore, future research can examine how managers allocate bonuses while taking into consideration both between-team and within-team variation in contribution.

Fourth, most of our samples were collected from Mturk (except for the student sample in Study 1). While we had set up several prerequisites on Mturk to ensure the eligibility of our sample, we did not include the open-ended attention-check question in earlier studies (i.e., Pilot Studies 1 and 2 and Study 1) as we did in Studies 2 and 3 to check whether the data finally collected are of sufficient quality. However, in Studies 2 and 3, after excluding participants who provided gibberish or irrelevant responses from our analyses, we got consistent results from all our studies, suggesting that the quality of data collected from Mturk is good. Nevertheless, we encourage future research to add open-ended attention-check questions when collecting data.

8.4 | Conclusion

The equity norm has guided the distributional decisions of modern organizations for decades, and research has proven its effectiveness at the individual level (Garbers & Konradt, 2014). However, in today's team-based organizational settings, we find that managers are distracted by team size and de-emphasize the most important information—team contribution—when allocating bonuses to multiple teams. However, the present study offers an effective information nudge that reduces such bias by emphasizing the average team member contribution. We hope that our findings will stimulate further investigation into managers' bonus allocation decisions within the team context and provide nuanced guidance for managerial practice in bonus allocation.

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DATA AVAILABILITY STATEMENT

Survey materials, data, and code related to this article are available at https://osf.io/j38cn/?view_only=9af602d581b7405bb19aa7dc4f1 9060e.

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SUPPORTING INFORMATION

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