The Mediation Effect of Effort Choices on the Goal Difficulty-Performance Relationship

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Abstract

It is unclear in the goal setting literature that how the goal–performance relationship is mediated by various effort choices in mixed incentive systems that combine group-based and tournament compensation. Given the common application of mixed incentives systems, it is important to understand the mechanisms through which goal difficulty positively affects performance. In addition, it is unclear if mediation effects vary according to group identity. Using a real-effort experiment, we predict and find that the relationship between group goal difficulty and performance is mediated by participants' decisions to spend extra time on a task and sabotage teammates less often. When group identity is strong, choosing to spend more time on a task mediates this relationship. When group identity is weak, choosing to sabotage teammates less frequently mediates this relationship. The implications of these findings for theory and practice are discussed.

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1. Introduction

In this study, we investigate the central question: how does group goal difficulty (easy vs. hard) influence individual performance through effort choices (information sharing, extra time, and sabotage) in teams with varying levels of group identity (strong vs. weak)? Our experiment, conducted in a mixed incentives setting, aims to uncover the mechanisms by which goal difficulty and group identity interact to affect performance outcomes.

The positive relationship between setting specific goals and performance outcomes is one of the most robust findings in the goal-setting literature (Gellatly and Meyer, 1992). Goal-setting theory not only documents this causal relationship but also identifies four key mediators (choice/attention, effort, persistence, and goal attainment strategies) and moderators (ability, feedback, resource constraints, and commitment) (Latham and Locke, 2018; Locke and Latham, 2019).

In their review of goal-setting theory, Kramer et al. (2013) observe that the above findings apply to groups as well as individuals. In addition, they claim that working in groups involves information sharing since group members work interdependently. When useful information is acted upon, information exchange improves task performance by promoting group members' understanding of a task. However, team members sometimes withhold information. Worse, they may demotivate each other by undermining collective efficacy. Latham and Locke (2018) argue that a number of processes may mediate or moderate team effectiveness in group settings. One such factor is the conflict between individual goals and group goals. For instance, Seijts and Latham (2000) investigate the dilemma that arises when participants must decide whether to contribute as much as 25 cents to a group pool used for group compensation or save the residuals as personal income.

With the intention of extending the current understanding of goal setting, we study three mediators and one moderator of the relationship between goal difficulty and task performance in a mixed incentives setting. Our setting differs from the experiment by Seijts and Latham (2000) in that group members work for mutual group compensation and, additionally, compete for higher personal compensation. In other words, we utilize a mixed incentives system that combines a group incentive and a tournament incentive.

Mixed incentives systems that combine group-based and tournament-based output performance measures are increasingly seen in practical settings (Mueller et al., 2000). For example, Lotus Software, an IBM former subsidiary, implemented a mixed incentive system to motivate its teams, resulting in performance improvement (Parker et al., 2000). In fact, Hwang et al. (2009) report that about 30% of U.S. manufacturers use such incentive systems.

The increasing utilization of mixed incentives systems can partly be attributed to the fact that business success relies more and more on project-based groups (Mueller et al., 2000). A group-based incentive induces group members to cooperate while introducing a tournament incentive motivates individual effort (Irlenbusch and Ruchala, 2008). Theoretically, mixed incentives compensation

systems can alleviate the adverse effects of group-based compensation (e.g., free-riding) and tournament compensation (e.g., a failure to cooperate or share).

Intuitively, people have three effort choices in mixed incentives systems. They can choose to share useful information to promote group performance, sabotage others to receive a higher tournament reward, or exert additional individual effort to secure a higher tournament reward. Using the similar settings, Danilov et al. (2019) observe the effects of various combinations of group and tournament compensations on effort choices (effort/help/sabotage) with a one-shot experiment. Meanwhile, Dutcher et al. (2021) investigate the behavior of heterogeneous agents in mixed incentives systems. Despite extensive research on the effects of group and tournament compensations on effort choices, the existing literature lacks a comprehensive understanding of how effort choices (sharing information/extra effort/sabotage) mediate the relationship between group goal difficulty and performance, especially under varying conditions of group identity. Our study aims to fill this gap by investigating these mediating effects, thereby providing deeper insights into the dynamics of mixed incentive systems.

Business success is increasingly determined by team performance (Majerczyk et al., 2019). Organizations form teams by gathering workers from various areas and departments to carry out new projects and tasks. In such teams, performance depends on the quality of the interaction among team members (Arraya and Monico, 2020), particularly with regard to the exchange of information, motivation, and emotional relations (Itzchakov and Latham, 2020). For example, different degrees of motivation and emotional relations may result in different levels of group identity (i.e., strong vs. weak). Organizations use group identity as an informal control mechanism to influence employee behavior. Research indicates that promoting strong group identity improves cooperation and performance (Ellemers et al., 2004).

Examining the mediation effect of effort choices in mixed incentive systems, particularly with varying levels of group identity, is crucial for both theoretical and practical reasons. Mixed incentive systems balance cooperation and competition, and understanding how effort choices (sharing information, spending extra time, reducing sabotage) mediate the relationship between goal difficulty and performance can optimize these systems. Group identity significantly impacts team dynamics, with strong identity fostering cooperation and weak identity leading to competition. Exploring this moderating effect helps tailor incentive structures for cross-functional teams working toward shared objectives, like ESG goals. Theoretically, incorporating both mediators and moderators into the goal-setting framework advances our understanding of performance mechanisms. Practically, these insights enable organizations to design more effective incentive systems that enhance performance by fostering desirable behaviors and mitigating counterproductive ones, ultimately informing better internal control and performance management strategies.

In this study, we utilize a 2 × 2 factorial design and manipulate two factors: group identity (strong vs. weak) and group goal difficulty (hard vs. easy). Participants engaged in a decoding task using z-

Tree software, where they decoded letter combinations into numbers. Each participant received 10 effort points per period to allocate among sharing information, spending extra time, or sabotaging teammates. The task period was preset at 3 minutes, extendable to 4 minutes and 40 seconds if all points were allocated to extra time. Feedback on performance was provided at the end of each period.

Group identity (strong vs. weak) was manipulated by pairing participants either consistently or reassigned. Goal difficulty was manipulated with easy (50 combinations) and difficult (110 combinations) goals. Mixed incentives included a group-based incentive (5 USD per participant) and a tournament incentive (7 USD for higher output, 3 USD for lower output). If the pair failed to reach the goal, no compensation was given.

In our study, we conducted a mediation path analysis to understand how group goal difficulty affects group output. The findings show that this effect is mediated by two factors: participants allocating extra time to the task and less sabotage towards teammates. Additionally, the impact of group goal difficulty on output varies with the level of group identity. With a strong group identity, difficult goals enhance output as participants dedicate more time to the task. Conversely, in cases of weak group identity, difficult goals lead to increased output by reducing sabotage among teammates. Overall, the study indicates a positive relationship between group goal difficulty and performance output.

Our study has implications for both theory and practice. First, our research extends the existing body of goal-setting literature by identifying effort choices (sharing information, spending extra time, and sabotage) as novel mediators in the relationship between goal difficulty and performance, while also highlighting group identity as a crucial moderator. These insights add depth to the understanding of how specific behavioral mechanisms operate within mixed incentive systems. By investigating the interplay between group-based and tournament-based incentives, this study provides a nuanced perspective on how mixed incentive systems influence individual and group behaviors. This contributes to the broader field of management accounting by demonstrating how different incentive structures can be optimized to balance cooperation and competition within teams.

Second, our findings offer actionable insights for corporate governance by illustrating how organizations can strategically design incentive systems to enhance performance, particularly within cross-functional groups. In these settings, where diverse team members must collaborate to achieve common goals (such as ESG objectives), understanding the mediating role of effort choices and the moderating effect of group identity can help managers tailor incentive schemes to foster desired behaviors. For instance, in cross-functional teams with strong group identity, managers should emphasize the importance of spending extra time on tasks to meet difficult goals, while in teams with weak group identity, reducing sabotage behaviors should be prioritized. These insights can help organizations develop more effective internal control systems and performance management strategies, ensuring that cross-functional groups work together more efficiently to reach their targets.

Third, by demonstrating how goal difficulty influences performance through specific effort choices, this research offers a framework for organizations to optimize their performance metrics, which is particularly valuable for project-based teams and other collaborative work settings where balancing individual and group incentives is critical. The study's insights into the dynamics of mixed incentives and effort choices provide a strategic advantage for organizations looking to implement challenging goals. Understanding these relationships allows for better alignment of employee behaviors with organizational objectives, leading to improved overall performance.

The paper is structured as follows. The next section discusses the background of the study and presents our hypotheses. The third section outlines the research design and methods. The fourth section reports the results. Finally, the fifth section discusses the principal findings of this study and considers the implications for future research.

2. Literature Review and Hypotheses Development

2.1 Mixed Incentives and Interest Prioritization

Current research emphasizes the importance of high-functioning teams for business success as organizations increasingly employ teams as central work units (DeMatteo et al., 1998; Guzzo and Dickson, 1996). For example, Lawler et al. (1995) report that 68% of Fortune 1000 companies used work teams in 1993 compared to 28% in 1987. Group-based compensation is generally deemed an effective incentive strategy to promote teamwork.

Research suggests that group-based incentives induce team members to exert more effort than individual incentives (Fisher, 1994) because group-based incentives promote information sharing among team members (Fisher et al., 2008). Such efforts subsequently result in higher group performance (Libby and Thorne, 2009). However, group-based incentives are not without issues. For instance, although group-based incentives are critical for promoting cooperation (e.g., help and information sharing), they may encourage free-riding (Heijden et al., 2009).

Researchers argue that compensation schemes that incorporate both individual tournament incentives and group-based incentives are more effective in motivating performance at both the individual level and the group level than tournament incentives or group-based incentives alone (DeMatteo et al., 1998; Kozlowski and Ilgen, 2006). Tournament[1] incentives alleviate the problems associated with free-riding by motivating individuals to compete for higher rank within teams and receive higher compensations (Lazear and Rosen, 1981). Thus, introducing an element of competition induces individuals to exert more effort, aligning individual interests with organizational goals.

Tournament incentives can reduce free-riding but may hinder teamwork. Yet, research suggests that mixed incentives balance these effects, enhancing group performance (Welbourne and Mejia, 1995). Studies show that mixed incentives encourage more information sharing and effort than

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[1] Tournaments are also commonly used in career promotion (see Altmann et al., 2012).

individual or group incentives alone (Pearsall et al., 2010), and lead to better speed and task performance (Barnes et al., 2011). Even with potential sabotage, mixed incentives still promote team welfare more effectively than group incentives (Chao and Siqueira, 2013). Overall, mixed incentives appear to drive both collaborative and competitive efforts among team members.

Mixed incentives are increasingly used in work settings. For example, in the internal audit department of Ameritech, employees of audit teams are compensated for both their relative performance rankings and the team's overall performance (Parker et al., 2001). In fact, a survey by Lawler et al. (2003) demonstrates that the use of mixed incentives in practice increased by 29% from 1990 to 2002. Similarly, Hwang et al. (2009) report that about 30% of U.S. manufacturers use mixed incentive systems.

2.2 Goal Setting—Mediators and Moderators

Locke and Latham (2019) identify four mediators and four moderators in goal-setting theory. The mediators include choice (people decide on their goals, its difficulty, and commitment; Latham and Locke, 2018), effort (difficult goals boost effort and performance, as seen in various studies, including Latham and Locke, 1975; Rasch and Tosi, 1992; Webb et al., 2013), persistence (people persist longer with difficult goals, demonstrated by Bavelas and Lee, 1978 and Huber, 1985), and strategy (strategies influence performance on complex tasks, Durham et al., 1997).

The moderators are feedback (enhances goal-setting effects; Locke and Latham, 2019), goal commitment (a prerequisite for goals to influence behavior), ability (affects the feasibility of achieving goals; Locke, 1982), and situational factors (necessary resources affect goal achievement; Arshoff, 2014). These elements together shape the effectiveness of goal-setting in influencing individual behavior and performance.

2.3 Hypotheses 1

The existing literature has identified multiple mediators and moderators affecting the goal–performance relationship. This study aims to further understand how this relationship is mediated by effort choices in a mixed incentives setting. We predict that the positive effect of goal difficulty on performance is mediated by participants' decisions to exert more effort and sabotage their teammates less often. As discussed, within mixed incentives systems, the group-based incentive component motivates people to cooperate and work hard toward the group goal. Meanwhile, the tournament incentive component motivates people to compete for higher individual rewards. As the goal difficulty level increases, it becomes harder to achieve the group goal. Therefore, we predict that people are more likely to choose to share information and less likely to choose to sabotage their teammates in order to improve group output. Simultaneously, they are motivated to exert extra effort to increase their individual output to a) increase their chance of meeting the group goal and b) outperform their peers to earn the higher individual reward. The first set of hypotheses is as follows and illustrated in Figure 1.

H1a: The relationship between group goal difficulty and performance is mediated by the decision to share information. Group goal difficulty motivates sharing, thereby increasing performance.

H1b: The relationship between group goal difficulty and performance is mediated by the decision to spend extra time on the task. Group goal difficulty motivates individuals to spend extra time on the task, thereby increasing performance.

H1c: The relationship between group goal difficulty and performance is mediated by the decision to sabotage teammates. Group goal difficulty discourages individuals from sabotaging their peers, thereby increasing performance.
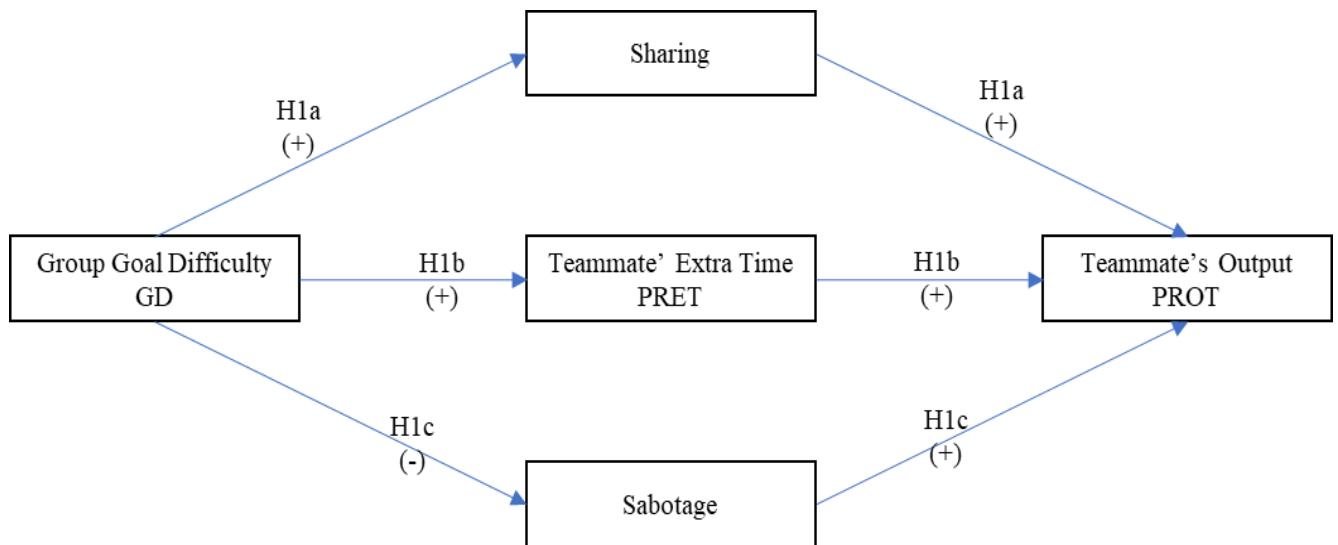

Figure 1. Hypotheses 1: The predicted mediating effect of sharing (H1a), teammate's extra time (H1b), and sabotage (H1c) on the relationship between group goal difficulty (GD) and performance (PROT)

2.4 Group Identity

Social Identity Theory suggests that an individual's self-concept is largely derived from their group memberships (Tajfel and Turner, 1979). This theory highlights that people categorize themselves and others into various groups, impacting decision-making and group favoritism. Emotional and psychological identification with a group aligns an individual's self-concept with group characteristics, rather than unique personal attributes (Turner, 1982). Such identification leads to behaviors that favor the group for a positive self-concept (Tajfel, 1978).

Social identification involves a psychological shift from seeing oneself as an individual to being a representative of a group, influencing mutual attraction and cohesion within the group (Turner, 1982; Towry, 2003). However, social identity is distinct from group cohesion, with the former being an attraction to the group and the latter involving personal attractions within the group. The salience of group identification changes decision-making processes, making ingroup members perceive themselves as more diverse than outgroup members (Hogg, 1992). Wit and Wilke (1992) shows that

strong group identity can increase cooperation in various social dilemmas, although this may not always be the case in non-interactive or one-off scenarios.

2.5 Hypotheses 2

As discussed above, the priorities of group members are affected by group identity. When group identity is strong, group members prioritize the group over themselves; when group identity is weak, they prioritize themselves over the group. According to this theory, we predict that group identity moderates the mediation effect of effort choices on the relationship between group goal difficulty and performance.

Specifically, when group identity is strong, we expect that the relationship between group goal difficulty and performance is mediated by the decision to spend extra time on the task. People in strongly identified groups prioritize the group interest above their own interests. Therefore, they will share information and spend extra time to achieve the group goal as it becomes more difficult. We do not expect a sabotage mediation effect (reducing sabotage to increase output) because we expect strongly identified groups to sabotage at a low level. The second set of hypotheses is as follows and illustrated in Figure 2.

H2a: When group identity is strong, the relationship between group goal difficulty and performance is mediated by the decision to share information. Group goal difficulty motivates sharing, thereby increasing performance.

H2b: When group identity is strong, the relationship between group goal difficulty and performance is mediated by the decision to spend extra time on the task. Group goal difficulty motivates individuals to spend extra time on the task, thereby increasing performance.
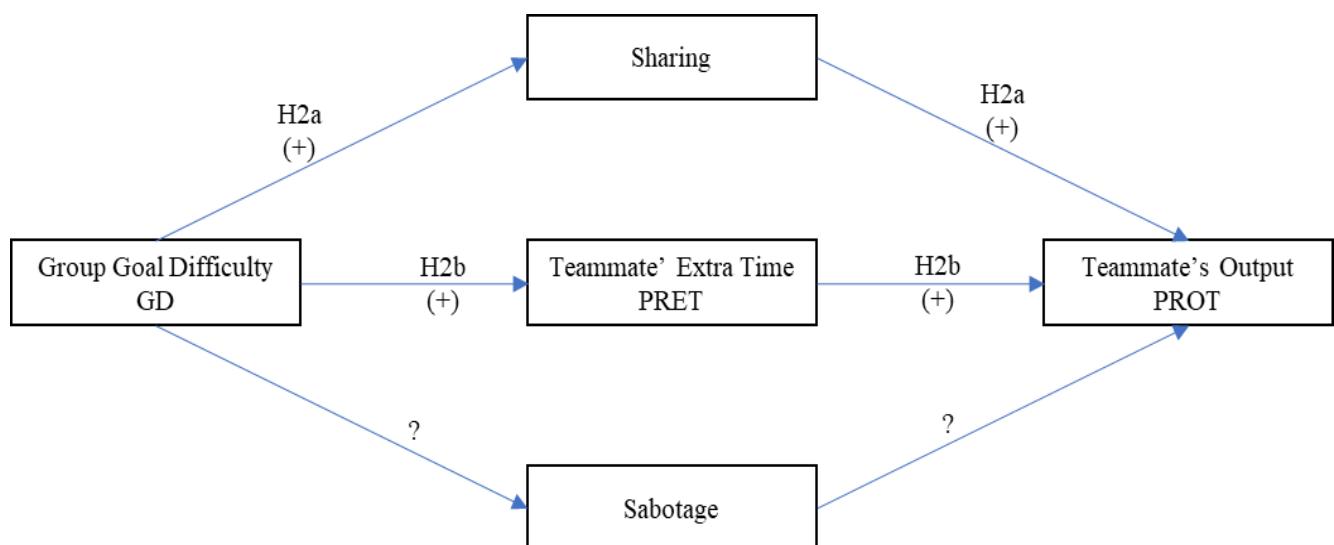

Figure 2. Hypotheses 2: The predicted mediating effect of sharing (H2a) and teammate's extra time (H2b) on the relationship between group goal difficulty (GD) and performance (PROT), when group identity is strong.

2.6 Hypotheses 3

When group identity is weak, we predict that the relationship between group goal difficulty and performance is mediated by the decisions to spend extra time on the task and to sabotage teammates less often. In weakly identified groups, people prioritize their own interests over those of the group. As the group goal becomes more difficult, we expect that individuals are less likely to sabotage their teammates in order to increase their chances of earning group-based rewards. Meanwhile, they are more likely to exert more effort to increase their own chances of receiving the higher tournament rewards. Therefore, our third set of hypotheses is as follows and illustrated in Figure 3.

H3a: When group identity is weak, the relationship between group goal difficulty and performance is mediated by the decision to spend extra time on the task. Group goal difficulty motivates individuals to spend extra time on their own tasks, thereby increasing performance.

H3b: When group identity is weak, the relationship between group goal difficulty and performance is mediated by the decision to sabotage teammates. Group goal difficulty discourages individuals from sabotaging their teammates, thereby increasing performance.
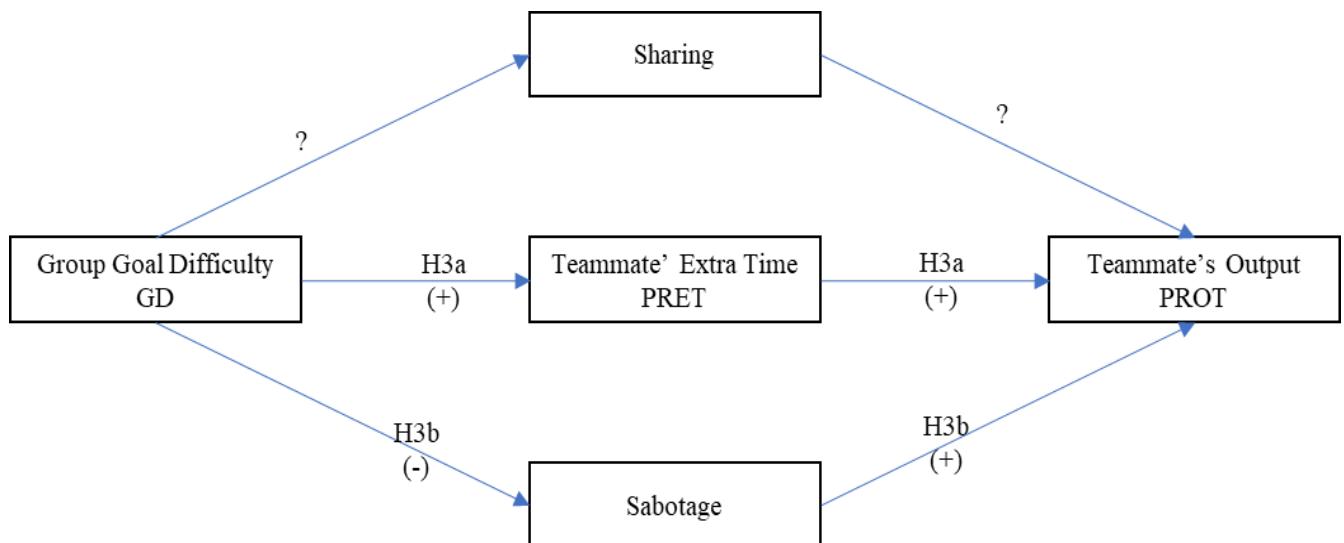

Figure 3. Hypotheses 3: The predicted mediating effect of teammate's extra time (H3a) and sabotage (H3b) on the relationship between group goal difficulty (GD) and performance (PROT), when group identity is weak.

3. Research Method

3.1 Group Identity Manipulation

We first manipulate group identity using a slogan guessing game (Kelly and Presslee, 2017). Participants are randomly assigned into pairs. Each pair wears T-shirts of the same color and is asked to create a unique pair name. Subsequently, the pairs play a slogan guessing game, in which they guess the company names associated with 16 slogans (e.g., Walmart's slogan: "Save money. Live better"). The pair with the most correct answers wins the game and receives a prize of candy (valued

at 10 USD). The winning pair is announced at the end of the experiment session to avoid the performance effect of slogan guessing on the decoding task.

After the slogan guessing game, further measures are taken to influence group identity. To encourage strong group identity, participants remain in the same pair for the decoding task. To encourage weak group identity, participants are reassigned to new partners and given new pair names by the experiment administrator. Participants are asked to answer three questions about group identity using a 7-point Likert scale (1: definitely no; 7: definitely yes): 1) Are you happy to be a part of your pair? 2) Do you feel that you are a member of your pair? 3) Do you like your counterpart in the pair?

3.2 Decoding Task

Participants complete the decoding task using z-Tree software (Fischbacher, 2007) and are asked to decode two-digit letter combinations into numbers. Each participant is provided with five unique numerical keys. The keys are valid only for the current period. The letter codes are generated from the 10 unique numerical keys assigned to the two participants in a pair. In other words, if participants choose not to share their keys with each other, they can only decode 50% of the codes generated in a task period at most. During a task period, participants receive real-time feedback on their individual performance. A clock is used to track the remaining time for the task period.

At the beginning of each task period, participants receive 10 effort points (a proxy for individual effort capability, e.g., energy). Participants are asked to allocate the 10 points among three effort choices: 1) Sharing—participants can share keys with their counterparts at the rate of 2 points for each key; 2) Extra Time—participants can choose to spend more time on their own decoding task at the rate of 1 point for 10 seconds; 3) Sabotage—participants can choose to reduce their counterparts' decoding output at the rate of 1 point for two units.

The preset period duration is 3 minutes. If participants allocate the full 10 points to Extra Time, they can extend the period duration to a total of 4 minutes and 40 seconds to decode more combinations. If participants allocate the full 10 points to Sabotage, their counterparts can lose a total of 20 combination outputs. To reduce the reciprocal effect associated with being the victim of sabotage, participants are informed there is a 5% chance that they may lose up to 20 units of output in any period due to a system error (coded in the task). The output losses are not additive. The system error is disabled if a participant is sabotaged.

After participants have allocated the 10 points, the decoding task begins. At the end of a period, participants receive feedback on their individual decoding performance, whether their pair has reached the pair performance goal, and how much they will be compensated if the period is selected for payment.

3.3 Group Goal Difficulty Manipulation

Based on the pilot study, we set the easy (difficult) goal for a pair to successfully decode 50 (110) combinations, which are two standard deviations below (above) the pilot mean. If a pair does not reach the goal, the participants will not earn compensation for the period.

3.4 The Mixed Incentives

The mixed incentives consist of a group-based incentive and a tournament incentive. For the group-based incentive, each participant in a pair earns 5 USD. For the tournament compensation, the participant with a higher output earns 7 USD, and the other participant earns 3 USD.

When a pair output does not reach the group goal, the participants in the pair will not receive any form of compensation. When a pair output reaches the group goal, participants earn either 12 USD (5 + 7 for the high performer) or 8 USD (5 + 3 for the low performer).

3.5 Measures

In this study, we measure the following variables.

Sharing: the number of points allocated to share personal keys with teammates in a period.

Peer Extra Time (PRET): the number of points allocated to spend extra time on the decoding task in a period.

Sabotage: the number of points allocated to reduce teammates' output in a period.

Peer Individual Output (PROT): the number of combinations successfully decoded minus the sabotaged combinations.

The manipulated variables are group identity (weak vs. strong) and group goal difficulty (easy vs. hard).

We measure peer extra time and peer individual output because participants' decisions to share keys or sabotage their teammates affect their teammates' output. Meanwhile, choosing to spend extra time on a task only affects an individual's own output. Therefore, we use these measures to observe how group goal difficulty affects the ingroup effort choices and, consequently, performance.

3.6 Procedure

The experiment is carried out according to the following procedure:

1. Upon arrival, participants are given unique worker I.D.s to be used throughout the experiment.
2. Participants are randomly formed into pairs. Each pair wears matching colored T-shirts. The experiment administrator reads the instructions for the slogan guessing game.

3. Each pair creates a unique name. The slogan guessing game begins, during which pairs guess the company names associated with 16 slogans.

4. In strongly identified groups, participants remain in the same pair for the decoding task. In weakly identified groups, participants are randomly reassigned into new pairs with names provided by the administrator. Participants are asked to answer three questions about group identity.

5. The administrator reads the decoding task instructions (participants also have their own copies). Any questions about the decoding task are answered during steps 4 to 6.

6. Participants answer eight pre-decoding task questions to test their understanding of the effort allocation choices and the forms of compensation. They cannot move to the next experimental stage until they answer all questions correctly.

7. Participants play two practice periods (3 minutes each) of the decoding task.

8. The decoding task begins.

9. Participants are asked to allocate 10 points to three effort choices (Sharing, Extra Time, and Sabotage).

10. Participants begin the decoding task. The task screen shows the keys (the five original keys plus any keys shared by the teammate), the time remaining in a period, and the number of combinations correctly decoded.

11. At the end of each period, participants receive the following feedback: the number of combinations they have individually decoded correctly; whether their pair output reaches the group goal; and how much they will be paid if the period is selected for compensation.

12. Participants repeat five periods of the decoding task.

13. Participants are asked to answer the same questions about group identity again before completing an exit questionnaire.

14. A period is randomly selected for payment. Participants are compensated for the decoding task.

15. The winning pair for the slogan guessing game is announced and awarded a bag of candy worth 10 USD.

16. Participants are thanked and leave the experiment site.

4. Results

4.1 Descriptive Statistics and Manipulation Checks

We conducted the study with 104 business students from a U.S. public university, 53% female, with an average age of 21. Each participant received an average payment of $10.50 for the decoding task. Descriptive analysis (Table 1) excluded the first-period data due to period and reciprocal effects control, focusing on four measures: Sharing, PRET, Sabotage, and PROT, across four test periods. Results showed an average of 4 points used for sharing and extra time (PRET), about 2 points for sabotage, and an average output (PROT) of 51 letter combinations.

We used Kelly and Presslee's (2017) approach to assess group identity manipulation, measuring it before and after the task. Strongly identified groups showed significantly higher group identity than weakly identified groups. Additionally, the study included a post-experiment questionnaire with three questions about perceived group goal difficulty. Participants with difficult goals reported significantly higher difficulty (5.55) compared to those with easy goals (3.29, t = 8.93, p < 0.01).

Table 1. Descriptive Analysis for Variables Used in Hypotheses Tests

	Mean	Std. Deviation	N
Sharing	4.33	3.018	416
PRET	4.21	2.828	416
Sabotage	1.46	2.328	416
PROT	51.37	17.343	416

Note: Sharing: points used to share keys with a teammate; PRET: points used on spending extra time on the decoding task; Sabotage: points used to sabotage a teammate's output'; PROT: Peer/teammate's output.

Table 2 reports Pearson correlations for our variables of interest. It illustrates that overall group goal difficulty is significantly correlated with sharing keys, spending extra time on the decoding task, sabotage, and teammates' output (p-values are not greater than 0.1). We find that sabotage is negatively correlated with spending extra time on the decoding task (significant at 0.1 level). This indicates that choosing to sabotage teammates demotivates participants to exert extra effort on the performance of their own tasks.

4.2 Tests for Hypotheses 1

We conduct our hypotheses tests using process macro in SPSS (Hayes, 2018). In our hypothesis tests, we control for group effect, period effect, individual decoding task capability, earnings in the previous period, and sharing in the previous period as we think these group and individual dynamics are potential confounding factors for our analysis.

Table 2. Pearson Correlations for Variables Used in Hypotheses Tests

	GD	Sharing	PRET	Sabotage	PROT
All Sample					
GD	1				
Sharing	.099**	1			
PRET	0.089*	-0.074	1		
Sabotage	-0.236***	-0.465**	-0.084*	1	
PROT	0.204***	0.399***	0.393***	-0.428***	1
Weak Group Identity					
GD	1				
Sharing	0.063	1			
PRET	0.089	-0.034	1		
Sabotage	-0.173**	-0.563***	-0.154**	1	
PROT	0.227***	0.380***	0.448***	-0.426***	1
Strong Group Identity					
GD	1				
Sharing	0.131**	1			
PRET	0.101	-0.109*	1		
Sabotage	-0.327***	-0.373***	0.041	1	
PROT	0.191***	0.420***	0.338***	-0.423***	1

Note: *, **, ***. Correlation is significant at the 0.1 level, 0.05 level, and 0.01 level respectively (2-tailed). GD: Group goal difficulty. PRET: points used to spend extra time on the task; PROT: a teammate's decoding output.

The results for the first set of hypotheses are reported in Table 3. The results of path analysis (Table 3, Panel A) suggest that increasing group goal difficulty does not affect sharing activity (Coef. = -0.13, t-stat.= -0.34, p = 0.73). However, sharing more keys does increase participants' output (Coef. =1.84, t-stat.=7.39, p < 0.01). This result indicates that H1a is not supported. H1b predicts that increasing group goal difficulty motivates participants to spend extra time on the decoding task and consequently increases their output. The coefficient for the relationship between group goal difficulty and choosing to spend extra time on the task is 1.80 (t-stat.=5.61, p < 0.01) and for the relationship between choosing to spend extra time on the task and output is 2.09 (t-stat.=7.97, p < 0.01). Furthermore, we find that increasing group goal difficulty is negatively correlated with choosing to sabotage teammates (Coef. =-1.45, t-stat.=-5.17, p < 0.01) and that choosing to sabotage teammates is negatively correlated with output (Coef. =-1.92, t-stat.=-5.68, p < 0.01).

Table 3, Panel B reports the analysis of indirect effects (standardized). It illustrates that the indirect effect of choosing to share information is not significant (the coefficient is −0.01, the confidence interval is [−0.09, 0.07]). Therefore, H1a is not supported. In addition, Table 3 illustrates that the indirect effects of choosing to spend extra time and to sabotage teammates are significant (the coefficients are 0.22 and 0.16, respectively, and the confidence intervals are [0.13, 0.32] and [0.10, 0.24], respectively). Therefore, H1b and H1c are supported. In summary, the results demonstrate that increasing group goal difficulty can improve individual performance output as participants elect to spend extra time on the task and sabotage their teammates less often.

Table 3. Results for Hypotheses 1

Panel A: Path Analysis Results - Main Sample (N = 416)			
	Coef.	**t-stat.**	**P-val.**
GD→Sharing	-0.13	-0.34	0.73
GD→PRET	1.80	5.61	<0.01
GD→Sabotage	-1.45	-5.17	<0.01
GD→PROT	4.19	2.32	0.02
Sharing→PROT	1.84	7.39	<0.01
PRET→PROT	2.09	7.97	<0.01
Sabotage→PROT	-1.92	-5.68	<0.01
Panel B: Analysis of Indirect Effects - Standardized			
	Coef.	**BootLLCI**	**BootULCI**
GD→Sharing→PROT (H1a)	-0.01	-0.09	0.07
GD→PRET→PROT (H1b)	0.22	0.13	0.32
GD→Sabotage→PROT (H1c)	0.16	0.10	0.24

Note: GD: Group goal difficulty; PRET: points used to spend extra time on the task; PROT: a teammate's decoding output; P-value is two tailed.; Controlled for group and period effects.

4.3 Tests for Hypotheses 2

In this section, we discuss our findings concerning the indirect effects when group identity is strong (Table 4). We predict that when group identity is strong, a harder group goal motivates individuals to choose to share more information and spend extra time, which consequently increases individual performance output. The results partially support our predictions. Specifically, H2b is supported, but H2a is not. The Panel A of Table 4 indicates that group goal difficulty is positively correlated with choosing to spend extra time on the task (Coef. =1.72, t-stat.=2.49, p = 0.01), and spending extra time on the task is positively correlated with output (Coef. =1.96, t-stat.=5.64, p < 0.01). In addition, the indirect effect of choosing to spend extra time on the task is significant (in Panel B of Table 4, the standardized coefficient is 0.20, and the confidence interval is [0.05, 0.40]). Surprisingly, we find that increasing group goal difficulty can decrease individual output as participants are less likely to share information (in Panel A of Table 4, the standardized coefficient is −0.21, and the confidence interval is [−0.39, −0.04]). The results in Panel A of Table 4 indicates that increasing group goal difficulty demotivates participants to share information (Coef. =-1.65, t-stat.=-2.15, p = 0.03). This finding suggests that participants are concerned that allocating more points to sharing information limits their ability to spend extra time on the decoding task and thus may prevent their team from meeting the goal. The results indicate that when group identity is strong, increasing group goal difficulty motivates people to spend more time on a task to improve performance.

Table 4. Results for Hypotheses 2

Panel A: Path Analysis Results - Strong Group Identity (N = 232)

	Coef.	t-stat.	P-val.
GD→Sharing	-1.65	-2.15	0.03
GD→PRET	1.72	2.49	0.01
GD→Sabotage	-0.61	-1.16	0.25
GD→PROT	-2.16	-0.58	0.56
Sharing→PROT	2.16	6.49	<0.01
PRET→PROT	1.96	5.64	<0.01
Sabotage→PROT	-2.59	-5.40	<0.01

Panel B: Analysis of Indirect Effects - Standardized

	Coef.	BootLLCI	BootULCI
GD→Sharing→PROT (H2a)	-0.21	-0.39	-0.04
GD→PRET→PROT (H2b)	0.20	0.05	0.40
GD→Sabotage→PROT	0.09	-0.05	0.23

Note: GD: Group goal difficulty; PRET: points used to spend extra time on the task; PROT: a teammate's decoding output; P-value is two tailed.; Controlled for group and period effects.

4.4 Tests for Hypotheses 3

Finally, we discuss the findings relating to the indirect effects when group identity is weak (Table 5). The third set of hypotheses predicts that when group identity is weak, the decisions to spend extra time on a task (H3a) and to sabotage teammates less often (H3b) mediate the relationship between group goal difficulty and performance. The path analysis (Table 5, Panel A) illustrates that the relationship between group goal difficulty and choosing to spend extra time on the decoding task is significant (Coef. =1.39, t-stat.=1.73) at the 0.1 level and that the relationship between choosing to spend extra time on the decoding task and output is significant (Coef. =2.39, t-stat.=5.99) at the 0.01 level. Table 5, Panel B indicates that the indirect effect of choosing to spend extra time on the task is not significant at the 0.05 level (the standardized coefficient is 0.19, and the confidence interval is [−0.01, 0.42]). The results suggest that H3a is marginally supported.

Table 5, Panel A indicates that group goal difficulty is negatively correlated with choosing to sabotage teammates (Coef. =1.39, t-stat.=1.73, p = 0.07) and that choosing to sabotage teammates is negatively correlated with output (Coef. =-1.48, t-stat.=-3.01, p < 0.01). Table 5, Panel B indicates that the indirect effect of sabotage on the relationship between group goal difficulty and performance is significant at the 0.05 level (the standardized coefficient is 0.12, and the confidence interval is [0.01, 0.24]). Therefore, H3b is supported. Taken together, the results suggest that when group identity is weak, increasing group goal difficulty reduces the extent to which people choose to sabotage their teammates to improve performance.

Table 5. Results for Hypotheses 3

Panel A: Path Analysis Results - Weak Group Identity (N = 184)			
	Coef.	**t-stat.**	**p-val.**
GD→Sharing	0.59	0.60	0.55
GD→PRET	1.39	1.73	0.09
GD→Sabotage	-1.44	-1.85	0.07
Sharing→PROT	1.50	4.00	<0.01
PRET→PROT	2.39	5.99	<0.01
Sabotage→PROT	-1.48	-3.01	<0.01
Panel B: Analysis of Indirect Effects - Standardized			
	Coef.	**BootLLCI**	**BootULCI**
GD→Sharing→PROT	0.05	-0.12	0.21
GD→PRET→PROT (H3a)	0.19	-0.01	0.42
GD→Sabotage→PROT (H3b)	0.12	0.01	0.24

Note: GD: Group goal difficulty; PRET: points used to spend extra time on the task; PROT: a teammate's decoding output; P-value is two tailed.; Controlled for group and period effects.

In summary, in the context of a mixed incentive setting, choosing to spend extra time on the decoding task and choosing to sabotage teammates less often mediate the relationship between group goal difficulty and performance. When group identity is strong, choosing to spend longer on the task mediates the relationship between group goal difficulty and performance. When group identity is weak, choosing not to sabotage teammates mediates the relationship between group goal difficulty and performance.

5. Discussion and Conclusion

In this study, we find individuals' decisions concerning whether to spend extra time on a task and whether to sabotage their teammates mediate the relationship between group goal difficulty and performance. When group identity is strong, we find this relationship is mediated by the decision to spend extra time so that when group goal difficulty increases, participants choose to spend extra time on their own decoding task to improve output. When group identity is weak, this relationship is mediated by the decision to sabotage their teammates so that when group goal difficulty increases, participants sabotage their teammates less often to improve output. Contrary to our hypothesis, when group identity is strong, we find that increasing goal difficulty reduces participants' motivation to share information, which consequently reduces output. We believe this is because participants choose to use more points to extend their work period so that they can decode more combinations. Furthermore, given the effort-based nature of the task, the addition of more keys may make it harder to find the appropriate key to use and thus slow productivity.

Our study has significant theoretical and practical implications. Theoretically, it extends goal-setting literature by identifying effort choices (sharing information, spending extra time, and sabotage) as novel mediators in the relationship between goal difficulty and performance, and highlights group identity as a crucial moderator. Practically, our findings offer actionable insights for corporate governance, particularly within cross-functional groups. Understanding the mediating role of effort choices and the moderating effect of group identity can help managers design incentive systems that

enhance performance and foster desired behaviors, such as increased cooperation and reduced sabotage. These insights are especially valuable for organizations aiming to optimize performance metrics in collaborative work settings, ensuring alignment of employee behaviors with organizational objectives and improving overall performance.

This study has several limitations that provide opportunities for future research. Since this study utilizes an effort-based task to observe the goal–performance relationship, the results may not necessarily be generalizable to other types of tasks (e.g., creative tasks) and thus must be interpreted with caution. Additionally, in this study, we utilize just one type of mixed incentives system, combining group-based and tournament compensation. Further research is thus required to investigate other combinations of mixed incentives. Also, we recognize the potential value of integrating qualitative research methods to enrich our findings. Future research could incorporate structured interviews or focus group discussions with participant post-experiment. This qualitative approach could provide deeper insights into the psychological and social dynamics that underpin the quantitative results, offering a more comprehensive understanding of the factors influencing effort choices and performance in mixed incentive systems.

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