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I Know Something You Don't Know: The Effect of Relative Performance Information and Individual Performance Incentives on Knowledge Sharing

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ABSTRACT: When employees share knowledge with their colleagues, the efficiency of the colleagues' performance improves, which positively affects their productivity. However, employees can engage in counterproductive behavior by choosing not to share knowledge (passive behavior) or by choosing to share inaccurate knowledge with their colleagues (active behavior). In this study, we examine how providing relative performance information (RPI) and rewarding individuals with performance-based incentives can jointly affect individuals' choices to engage in counterproductive knowledge sharing behavior. Using an experiment, we identify an interactive effect of RPI and individual incentives, such that participants engage in counterproductive knowledge sharing behavior most frequently when they receive RPI and are assigned individual performance-based incentives. We also observe that RPI increases the frequency of both active and passive counterproductive knowledge sharing behavior.

Keywords: knowledge sharing; sabotage; counterproductive behavior; social comparison theory; relative performance information; incentive pay.

I. INTRODUCTION

When individuals within an organization develop, through experience, specific information about how to perform a task, they create knowledge (Vera-Muñoz, Ho, and Chow 2006). Knowledge sharing, defined as the act of sharing experiences or information with others, is generally believed to be a productive behavior in organizations (Myers 2017; Quast 2012; Sprinkle 2003; Teece 2000; Van Wijk, Jansen, and Lyles 2008). Individuals who share knowledge gain intrinsic rewards from the joy of sharing knowledge with others (Hau, H. Kim, Lee, and Y. Kim 2013; Lin 2007; Van Wijk et al. 2008) and social norms in organizations often encourage knowledge sharing (Wang 2004; Kelly 2010). Even so, individuals may avoid sharing knowledge with fellow employees because they gain a sense of power by keeping knowledge private (Vera-Muñoz et al. 2006), or they view their knowledge as part of their identity (Beggan 1992; Haesebrouck, Van den Abbeele, and Williamson 2015; Pierce, Kostova, and Dirks 2001). Companies blame lack of knowledge sharing for lost productivity through repetition of mistakes and failure to share best practices. An International Data Corp. (IDC) study estimates that Fortune 500 companies lose at least $31.5 billion a year by failing to share knowledge (as cited in Myers 2017). In a setting where

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knowledge sharing is important to firm performance, failure to share knowledge can be defined as a counterproductive behavior.

Relative performance information (RPI) provides individuals with feedback about their performance levels relative to their colleagues and is a common feature of many organizations' control systems. For example, Amazon and KPMG regularly disclose RPI to their employees (Kantor and Streitfeld 2015; Cashore 2017). We investigate the impact of RPI on the incidence and type of counterproductive knowledge sharing behavior and whether RPI moderates the effect of the type of incentive contract (i.e., individual performance-based or fixed pay) on counterproductive knowledge sharing behavior.

Our setting allows us to examine two different types of counterproductive behavior: passive and active. Passive counterproductive knowledge sharing behavior is defined as the choice to *not* share knowledge. Active counterproductive knowledge sharing behavior is defined as the choice to share *inaccurate* knowledge.[1] Passive counterproductive behavior is more nuanced, likely more common, and often more difficult to detect than active counterproductive behavior (Kahneman and Tversky 1982; Landman 1987; Mazar, Amir, and Ariely 2008).

Understanding the joint effects of RPI and performance-based incentives is important because, in practice, many organizations use both RPI and individual performance-based incentive compensation (Silverman 2011). For example, LiveOps, a virtual call center, provides RPI to employees using leaderboards while their incentive plan promotes individual performance (Silverman 2011). In addition, commissioned sales people (e.g., automobile sales people) are often provided RPI indicating the ranked sales figures of all sales people while at the same time receiving incentive compensation based on their sales (Digital Dealership Systems [n.d.]; Gibbs, Merchant, Van der Stede, and Vargus 2004, 2009). Thus, it is important to understand the joint effect of RPI and individual performance-based incentives on knowledge sharing when implementing these controls jointly within organizations.

RPI has been shown to motivate performance through increased social comparisons among peers (Gino and Staats 2011; Nordstrom, Lorenzi, and Hall 1990; Tafkov 2013). However, increased social comparison also creates a higher sense of competition and, therefore, is likely to increase the frequency of counterproductive behavior compared to when employees do not receive RPI (Charness, Masclet, and Villeval 2014; Wang 2017).[2] Thus, we expect that individuals provided with RPI will engage in counterproductive knowledge sharing behavior more often than individuals not provided with RPI.

While individual performance-based incentives (e.g., piece-rate pay, commissions) can motivate individuals to exert higher effort relative to fixed pay, they can also change the way individuals frame their decisions from a social exchange frame (when pay is not performance-based) to a competitive frame. Competitive framing of a situation increases self-interest and weakens social bonds (Kouchaki, Smith-Crowe, Brief, and Sousa 2013). Relative to individuals paid a fixed wage, individuals paid under performance-based incentives will increase their focus on maximizing their own economic payoffs and, as a result, may decrease the desire to share knowledge, thus increasing counterproductive knowledge sharing behavior.

However, knowledge sharing is a social process. Individuals receive social benefits by engaging in sharing (Hau et al. 2013), making social costs relevant to their decisions to engage in counterproductive knowledge sharing behavior. Individuals are sensitive to the negative impact their counterproductive behaviors have on others, for example when compensation of others is negatively affected (Gneezy 2005). Sensitivity to the cost of counterproductive behaviors on others may dampen the effect of incentives on counterproductive knowledge sharing behavior. When individuals are provided RPI *and* receive performance-based incentives, we expect competitive tendencies to have a greater impact on the choice to share knowledge than any sensitivity to the cost inflicted on a colleague. Thus, we expect individuals receiving both RPI and individual performance-based incentives will engage in counterproductive knowledge sharing behavior more frequently than individuals receiving both RPI and fixed pay, and individuals who do not receive RPI.[3]

We test our predictions using a 2 (RPI: present/absent) × 2 (individual performance-based incentive: present/absent) laboratory experiment where participants learn how to navigate a maze and earn points for each correct turn. After acquiring the knowledge about how to navigate the maze, participants observe a colleague navigating the same maze and can share their knowledge about how to successfully navigate the maze with their colleague. Participants may choose to share their knowledge, choose not to share their knowledge, or choose to share inaccurate knowledge with their colleague.

Collectively our results indicate that two management control features—RPI and individual performance-based incentives—increase the frequency of counterproductive behavior in a knowledge sharing context. Consistent with our expectations, we find that individuals that are provided with RPI engage in counterproductive behavior more frequently than

[1] We note that in our setting, the choice not to share knowledge and the choice to share inaccurate knowledge are mutually exclusive.

[2] In our setting, RPI is private. Individuals are only made aware of their own final ranking and performance score, and are unaware of the rankings and performance of other group members.

[3] We examine a setting where RPI is not linked to incentive pay. This setting is consistent with observations in practice (Kantor and Streitfeld 2015; Baker, Jensen, and Murphy 1988) and with some previous management accounting research on the impact of RPI on motivation and behavior (Hannan, McPhee, Newman, and Tafkov 2013; Tafkov 2013).

those not provided with RPI. Also, consistent with our expectations, we find that individuals provided with RPI and individual performance-based incentives engage in counterproductive behavior most frequently. In addition, we explore the frequency of active and passive counterproductive knowledge sharing behavior. We find that RPI increases the frequency of both active and passive counterproductive behavior, but passive counterproductive behavior is more frequent when individual performance-based incentives are present while active counterproductive behavior is more frequent when individual performance-based incentives are absent.

This study makes two contributions to research and practice. First, we examine the interactive effects of RPI and performance-based incentives on knowledge sharing decisions. Prior research indicates that RPI increases counterproductive behavior under a flat-wage incentive contract (Charness et al. 2014) and under an individual performance-based incentive contract (Wang 2017). Our study explores the joint effect of RPI and incentives on counterproductive behavior in a setting where there are no direct monetary or recognition benefits tied to RPI since it is private and not contracted upon. This builds on the research of Vera-Muñoz et al. (2006), who identify the need to examine organizational features, beyond direct incentives, on individuals' willingness to share information. In addition, understanding the joint influence of RPI and performance-based incentive pay on counterproductive behavior is important given many organizations commonly use this combination of control features in practice (Silverman 2011).

Second, we investigate the impact of RPI and performance-based incentives on individuals' choices between passive and active counterproductive knowledge sharing behavior. Understanding what motivates the choice between passive and active counterproductive behavior is important because the cost of active counterproductive behavior is likely higher than the cost of passive forms of counterproductive behavior. However, the frequency of passive counterproductive behavior is likely much higher than active counterproductive behavior in practice and passive counterproductive behavior is very difficult to detect.

We have organized the remainder of this paper in the following way: the next section develops the hypotheses; Section III describes the research design; Section IV presents the results; and the final section of the paper concludes with a discussion of results, limitations, and a description of further work.

II. HYPOTHESES DEVELOPMENT

Knowledge Sharing

Academics and practitioners tout knowledge and the sharing of knowledge as increasingly important in today's knowledge economy (Styhre 2002; Myers 2017). For example, 71 percent of respondents to a KPMG survey believe that knowledge sharing leads to better decision making, and 68 percent believe that knowledge sharing leads to faster responses to key business issues (KPMG 2000). Inefficiencies caused by a lack of knowledge sharing can reduce productivity due to repetition of mistakes, lack of sharing of efficient practices, and wasted resources caused by solving a previously solved problem (Myers 2017).[4]

There are both intrinsic and extrinsic motivations for knowledge sharing. Prior accounting research has focused primarily on extrinsically motivating knowledge sharing with incentives for individuals (Bol and Leiby 2015; Kelly 2010) or groups (Hwang, Erkens, and Evans 2009; Kelly 2010).[5] Alternatively, intrinsically motivated individuals share knowledge for the fun, pleasure, satisfaction, and pride they receive from knowledge sharing (Chennamaneni, Teng, and Raja 2012; Hau et al. 2013; Vera-Muñoz et al. 2006). Recent survey results provide evidence that intangible psychological incentives can have a stronger effect on knowledge sharing than extrinsic incentives (Chennamaneni et al. 2012). In addition, failure to share knowledge is contrary to social norms in a knowledge-based economy reliant on this ethic (Wang 2004; Styhre 2002). Knowledge sharing among individuals within an organization is often viewed as expected and necessary because knowledge gained through employment "belongs" to the organization rather than to the individual (Jarvenpaa and Staples 2001; Constant, Kiesler, and Sproull 1994).

Despite the intrinsic and extrinsic benefits to knowledge sharing, individuals may be motivated to use knowledge sharing opportunities to engage in counterproductive behaviors (i.e., withholding knowledge or sharing inaccurate knowledge) because individuals often gain a sense of power by keeping knowledge private (Vera-Muñoz et al. 2006). Moreover, individuals often view knowledge as part of their identity and thus, knowledge sharing is perceived as rather costly (Beggan 1992; Haesebrouck

[4] We acknowledge that some organizations may strategically choose to increase competition among employees and reduce knowledge sharing in an effort to increase innovation and performance (e.g., Amazon intentionally creates a high-tension, high-competition environment to drive innovations [Kantor and Streitfeld 2015]). Although this may be a strategic choice for some organizations, evidence from the field suggests that many organizations view knowledge sharing as an opportunity to increase employee productivity and as a result knowledge sharing initiatives are often a strategic choice for these organizations (Myers 2017; KPMG 2000).

[5] We examine a setting where there are no extrinsic, economic benefits to counterproductive behavior.

et al. 2015; Pierce et al. 2001), making individuals reluctant to share knowledge with others. Next, we consider how providing RPI and individual performance-based incentives can affect individuals' knowledge sharing decisions.

Knowledge Sharing and Relative Performance Incentives

We expect performance feedback mechanisms, such as RPI, to affect the extent to which individuals engage in counterproductive knowledge sharing behaviors. RPI provides individuals feedback about their performance relative to their peers. Providing individuals with RPI increases individual performance in future periods, even when pay is not contingent on relative performance (Hannan, McPhee, Newman, and Tafkov 2013; Hannan, Krishnan, and Newman 2008; Tafkov 2013). For example, evidence from a laboratory experiment indicates that, under a piece-rate incentive scheme, participants provided with RPI make better output quantity decisions than participants that are not provided with RPI (Hannan et al. 2008). However, providing RPI also creates increased competitiveness among individuals (Festinger 1954; Wood 1989). When faced with an increased sense of competition toward their colleagues, individuals often engage in unethical counterproductive behaviors designed to protect or improve their own performance relative to others (Balafoutas, Kerschbamer, and Sutter 2012; Charness et al. 2014; Lazear 1989; Schwieren and Weichselbaumer 2010; Shleifer 2004; Wang 2017). For example, in an experimental study where participants complete a decoding task, Charness et al. (2014) find that individuals who are provided RPI demonstrate more competitive behavior and are more likely to sabotage their colleagues' performance rankings than individuals not provided RPI. Saboteurs pay either to artificially improve their own performance rank or to sabotage another colleagues' decoding work, even when there is no monetary benefit for higher rank or higher performance. Similar counterproductive behaviors may not necessarily be observed in a knowledge sharing setting because knowledge sharing requires a social exchange (Lin 2007), knowledge sharing is often a social norm in organizations (Wang 2004), and individuals obtain intrinsic benefits when sharing knowledge (Hau et al. 2013).

An individual's level of competitiveness is important to their decision to share knowledge (Lin 2007). Increased competition puts a strain on individuals' social ties with their colleagues and focuses them on their own performance and achievements. Individuals may believe their knowledge gives them a competitive advantage over their colleagues and that sharing knowledge would diminish this advantage creating a personal cost of sharing knowledge with others (Wang 2004). When the level of competition is higher, we expect that individuals will attempt to retain their competitive advantage by electing not to share knowledge with their colleagues. Therefore, we posit that when individuals receive RPI, they will be more likely to engage in counterproductive knowledge sharing behavior than when they do not receive RPI. Our hypothesis, stated in alternative form, is as follows:

H1: Individuals will engage in counterproductive knowledge sharing behavior more often when provided RPI than when not provided RPI.

Relative Performance Incentives and Individual Performance-Based Incentives

To explore the joint effect of RPI and performance-based incentives, we examine how providing RPI moderates the effect of rewarding individual performance on counterproductive knowledge sharing behavior. Taken on their own, individual performance-based incentives are generally an effective tool to increase individuals' motivation to perform a task because the incentive contract links compensation to the measurable outcome of task performance (Bonner, Hastie, Sprinkle, and Young 2000; Bailey and Fessler 2011). When performance-based incentives are used to reward individuals, these incentives motivate individuals to maximize their own performance (Bonner et al. 2000), however, this increased motivation is not without its costs.

Researchers argue that the mere presence of monetary incentives changes the way individuals frame decisions (Kouchaki et al. 2013).[6] Fiske (1992) presents four models of social interaction: common sharing, authority ranking, equality matching, and market pricing. The model used by an individual in any given interaction will dictate the meaning, intentions, plans, expectations, judgment, and motivations for the given exchange (Fiske 1992). The presence of money activates the market pricing model for individuals where "what matters is how a person stands in proportion to others" (Fiske 1992, 692) such that individuals primed with money help others less than those not primed with money (Vohs, Mead, and Goode 2008). Moreover, the presence of monetary incentives elicits a competitive decision frame, weakens social bonds, and increases self-focus and self-interest (Kouchaki et al. 2013; Vohs et al. 2008). Thus, exposure to monetary incentives reframes a social exchange as a competitive choice, increasing self-interest and weakening social bonds. Since the sharing of knowledge is a social process, we

[6] Decision frames help the decision maker to determine "what type of decision" they are making and, therefore, what decision rules they should apply (Messick 1999).

expect a weakening of social bonds will negatively affect knowledge sharing. For example, in a group knowledge exchange, where reciprocal knowledge sharing improves performance, the payment of individual incentives results in reduced knowledge sharing compared to a setting without individual incentives (Kelly 2010).[7]

In contrast, ethical models of decision making suggest that individuals consider the effect of their actions on others (in addition to themselves) when making a decision (e.g., Jones 1991). Prior research indicates individuals are sensitive to the cost of deception, a form of counterproductive behavior, on the other party (Gneezy 2005). For example, in a laboratory setting, Gneezy (2005) finds that when individuals are aware that their counterproductive actions negatively impact their colleague's earnings, they engage in less counterproductive behavior. Therefore, individuals may not engage in increased counterproductive knowledge sharing in the presence of individual incentives due to the cost of this action to their colleagues.

We expect that when individual incentives create a competitive decision frame, the presence of RPI will increase individuals' level of competitiveness, such that the need to compete will be more influential on their knowledge sharing decisions than the cost of their counterproductive knowledge sharing behavior to their peers. Indeed, the effect of RPI on performance is stronger when individual performance-based incentives are assigned due to the increased importance of social comparisons (Tafkov 2013). The competitive frame triggered by the presence of individual incentives increases individuals' focus on their own self-interest. Therefore, when companies provide individuals with RPI and incentives, individuals focus on their need to outperform their colleagues. Thus, in a setting where RPI is provided and incentive compensation is used, individuals will be less sensitive to the needs of others, less focused on the intrinsic benefits of knowledge sharing, and more focused on their own self-interest, which includes outperforming their colleagues. When individuals are more focused on their own self-interest, they are more likely to engage in counterproductive knowledge sharing behavior. Therefore, the provision of individual performance-based incentives *and* RPI leads us to expect individuals to engage in the greatest amount of counterproductive knowledge sharing behavior. Our hypothesis, depicted in Figure 1, is as follows:

H2: Individuals receiving both RPI and individual performance-based incentives will engage in counterproductive knowledge sharing behavior more frequently than individuals receiving RPI but not individual performance-based incentives, or individuals not receiving RPI at all.

Forms of Counterproductive Behavior

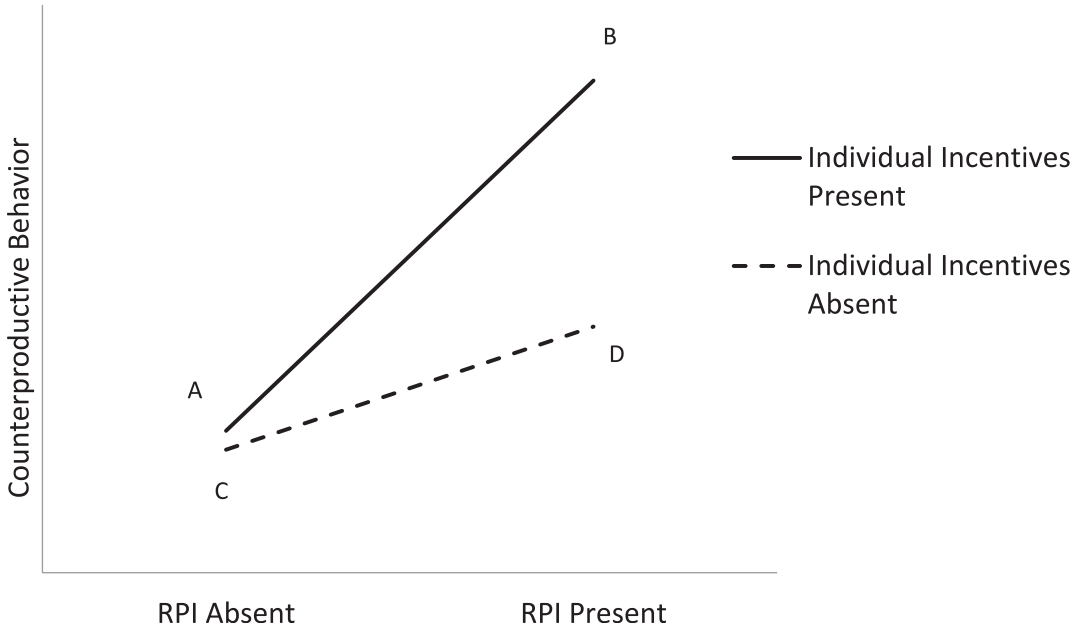
In the previous section, we examine factors that affect individuals' decisions to engage in counterproductive behavior by failing to share knowledge with their colleagues. As noted above, failing to share knowledge encompasses two forms of counterproductive behavior: *active* (i.e., providing inaccurate knowledge) and *passive* (i.e., not sharing knowledge). Prior research has focused on active counterproductive behavior (e.g., Charness et al. 2014 and Wang 2017) and has left unexplored the question of how individuals act in a setting where both active and passive counterproductive behaviors are possible.

Active counterproductive behavior is an intentional action used to gain an advantage over a colleague by misstating performance (Shleifer 2004; Schwieren and Weichselbaumer 2010; Charness et al. 2014) or ruining a colleagues' work (Lazear 1989; Balafoutas et al. 2012; Charness et al. 2014; Wang 2017). In contrast, passive counterproductive behavior is a decision to not engage in a productive action. Unlike active counterproductive behavior, passive counterproductive behavior is often private and unobservable because other individuals do not know, for certain, whether an individual behaved counterproductively. In addition, the potential cost of active counterproductive behavior, such as the destruction of units of production, may be more severe than the cost of passive counterproductive behavior, such as a loss of efficiency. Passive counterproductive behavior provides an opportunity for the knowledge holder to be counterproductive without direct recrimination or guilt often associated with active counterproductive behaviors (Kahneman and Tversky 1982; Landman 1987; Mazar et al. 2008).

Experimental evidence suggests that active counterproductive behavior (e.g., the destruction of a fellow employee's production units) increases when RPI is provided in a setting where piece-rate incentives are paid (Wang 2017). Similarly, active counterproductive behavior (e.g., artificially reducing a colleague's performance) has been shown to increase when RPI is provided in a setting where a flat-wage is paid (Charness et al. 2014). However, prior research focuses on settings where individuals' only option for counterproductive behavior is active counterproductive behavior. Since individuals are sensitive to the cost of their counterproductive behavior on the other parties (Gneezy 2005), they may be less willing to engage in active counterproductive behavior because doing so will have a direct, negative impact on their colleague's wages. It remains unclear whether the same hesitation will apply to passive counterproductive behavior. It could be that individuals are equally sensitive to the negative impact of both active and passive counterproductive behaviors on their colleagues. Conversely, individuals may be less sensitive to the impact of passive counterproductive behaviors on their colleagues because it is difficult for others to link

[7] Kelly (2010) considers a setting where RPI is not provided.

FIGURE 1
Predicted Effects of Relative Performance Information (RPI) and Individual Incentives on Counterproductive Knowledge Sharing Behavior



This figure depicts the hypothesized pattern of individuals' counterproductive behavior. H1 predicts that RPI will have a main effect and H2 predicts that providing individual incentive pay with RPI present results in the most counterproductive behavior.

an individual's decision to withhold information with a negative impact on their colleague's performance. Moreover, a colleague's losses due to inaction (e.g., passive behavior) produces less guilt and recrimination to the individual than a colleague's losses due to action (e.g., active behavior) (Kahneman and Tversky 1982; Landman 1987; Mazar et al. 2008). Given the absence of a clear theoretical basis for predicting whether passive and active counterproductive behaviors will be similarly impacted by RPI and individual performance-based incentives, we pose the following research question:

RQ1: Will RPI and performance-based incentives impact the frequency of active and passive counterproductive behavior similarly?

III. METHOD

Task

We conduct an experiment in which participants complete two stages: (1) task learning and (2) knowledge sharing.[8] In the task learning stage, participants gain knowledge about how to perform a task through experience, specifically by learning to find their way through a computerized maze with ten decision points. At each decision point, participants must select one of three directions: forward, left, or right. If the participants select the correct direction, they proceed to the next decision point. If the participants select an incorrect direction, they choose another direction until they select the correct direction. We provide participants the following information about their maze performance: (1) the number of correct directional decisions they make, (2) the number of incorrect directional decisions they make, and (3) their performance score for the task.

The performance score for the task is calculated based on the number of directions a participant selects at each decision point before identifying the correct direction. If a participant selects the correct direction on the first try, they earn 40 points; if a participant selects the correct direction on the second try, they earn 20 points; if a participant selects the correct direction on the third try, they earn 0 points. For example, if the participant identified the correct direction on the first try for six of the decision

[8] Ethics approval for this study was obtained from the Research Ethics Boards at all authors' universities.

points, the correct direction on the second try for three of the decision points, and the correct direction on the third try for one of the decision points, their performance score would be 300 (6 decisions × 40 points + 3 decisions × 20 points + 1 decision × 0 points). Participants can earn up to 400 points for completing the maze. The performance score provides a mechanism to measure the participants' ability to identify the correct maze directions relative to other participants completing the maze.[9] Specifically, an individual with a high performance score identifies the correct direction at more decision points than an individual with a low performance score.

To ensure that participants learn how to successfully complete the maze during the task learning stage of the experiment, participants document the correct direction at each decision point in a table printed on a piece of paper provided by the experimenters. After completing the learning stage of the task, participants are required to refer to their answers on the paper and then manually enter the correct directions for all ten decisions points into the computer program. Only after entering the correct directions into the program do participants proceed to the knowledge sharing stage of the task. Participants retain their correctly documented maze path for the knowledge sharing stage.

In the knowledge sharing stage, participants observe a colleague complete the maze task via the computer screen. At each decision point in the maze, participants are provided the opportunity in advance to share their knowledge about the maze task with their colleague. In the RPI present conditions, we tell participants that their final ranking will be given once all members of their group (including the colleague) complete the maze. To allow for consistency of the colleague's performance in the maze across all participants, everyone participating observes the same decisions made by the same colleague, and the colleague always takes the advice of the participant. The colleague is a student participant recruited in advance of the data collection from the same student pool used to recruit all our participants.[10] The colleague represents the receiver of knowledge in all cases.

The colleague's responses to the maze task (i.e., the responses selected without any knowledge sharing from a colleague) are programmed into the computer to ensure that each participant faces the same stimuli when given the opportunity to share knowledge with a colleague. The consistency of colleague responses throughout the maze is a design choice allowing us to compare the knowledge sharing choices of participants between conditions.[11] Throughout the knowledge sharing phase of the experiment, participants observe the directional decisions made by the colleague at each decision point, the total number of correct and incorrect decisions made by the colleague, and the colleague's performance score.

Independent Variables

Relative Performance Information

In the RPI present condition (*RPI Present*), participants receive their preliminary ranking upon completion of the task learning stage (first through fourth or fifth place, depending on group size).[12] Then, participants receive final rankings (first through eighth or tenth place depending on group size) after all individuals observe the colleague complete the maze (i.e., the end of the knowledge sharing stage). Before beginning the task, participants in the *RPI Present* condition must correctly answer a task understanding question related to receiving RPI. In the *RPI Absent* condition, participants did not receive any feedback about their performance relative to the other participants in their group.

Incentive Pay

In the incentive pay present condition (i.e., *Individual Incentives Present*), participants receive a flat wage of $10 plus an additional $0.02 per point of their performance score. In the incentive pay absent condition (i.e., *Individual Incentives Absent*),

[9] We designed the task to ensure that prior knowledge and expertise did not affect the results. The participants' score is determined based on the identification of the correct direction in the maze, which is not based on prior skills or experience, but is based on an element of luck. Performance on the task does not allow participants to draw inferences about their underlying knowledge and skills, which biases against our ability to find results.

[10] Our design choice to use one individual from the pool of participants to represent the same role to all participants is consistent with other management accounting research (Cardinaels, Roodhooft, and Warlop 2004; Christ and Vance 2018; Jollineau, Vance, and Webb 2012). For example, Jollineau et al. (2012) use the same individual to represent an anonymous manager to participants and Cardinaels et al. (2004) create a single computer-modeled competitor against whom participants compete.

[11] The colleague was paid a flat wage of $10.00 plus an individual incentive pay of $0.02/point of the colleague's maze score (similar to participants in the incentive pay condition). However, unlike the participants in the study, the colleague was paid after the experiment was complete based on the final average cumulative score resulting from all participants' information sharing decisions. Therefore, the more information shared by the participants, the higher the colleague's average cumulative score and resulting wage. Participants were not informed how the peer was paid.

[12] Before the learning stage begins, participants are randomly divided into groups of four or five individuals; 112 of the participants were assigned to a group of four individuals and 140 participants were assigned to a group of five individuals. These groups were used to determine RPI. Group size (four or five) is not statistically significant in any of our analyses and is not included in the models presented.

participants receive a flat-wage of $14 for completing the maze task.[13] The participants are informed of their compensation scheme in advance of starting the learning stage of the study. Before starting the task, participants must correctly answer a series of multiple choice questions about the task and the performance score. These questions serve as a manipulation check for the incentive manipulation and serve to ensure participants understand the task.[14]

Dependent Variable

Counterproductive Knowledge Sharing Behavior

In our setting, there are two ways that an individual could fail to share knowledge: (1) individuals could withhold accurate information about the correct direction at a decision point (*Passive Counterproductive Behavior*) or (2) individuals could provide the colleague with inaccurate directions at a decision point (*Active Counterproductive Behavior*). To measure the frequency with which individuals engage in *Counterproductive Behavior*, we count the number of decision points where participants engage in either form of counterproductive behavior.[15] For example, if the participant shared incorrect knowledge with the colleague at two decision points and withheld accurate knowledge from the colleague at three other decision points, the participant would have engaged in *Counterproductive Behavior* five times. There are ten decision points in the maze, and a participant's decision at each decision point is counted once; therefore, the maximum score for the frequency of *Counterproductive Behavior* variable is ten. In addition, we measure the frequency of *Passive Counterproductive Behavior* (withhold accurate information on directions from colleague) and the frequency of *Active Counterproductive Behavior* (provide the colleague with inaccurate directions) by separately counting the number of decision points where participants engage in each form of counterproductive behavior.

We incorporate two features into the experimental design to control for the possibility that participants mistakenly share inaccurate knowledge with the colleague. First, before beginning the knowledge sharing stage, we tell participants that the colleague is going to navigate the same maze they have just finished navigating, so they know that their knowledge will help the colleague. Second, we ensure participants know the correct path and have it readily available to them by requiring participants to record the correct maze path on a paper-based chart while completing the maze, and then input the maze path into the computer program prior to watching the colleague complete the maze. Participants are not allowed to move on to the information sharing stage until the correct maze path has been input into the computer. Thus, any incorrect information shared with the colleague is more likely to be a result of intentionally providing inaccurate information rather than unintentional error.

Covariate

Prior research suggests that group identity (Towry 2003; Hogg and Hains 1996) may influence knowledge sharing decisions. Group identity is the degree to which individuals have a strong psychosocial attachment to other group members (Towry 2003). Individuals' relationships with and trust in the co-workers in their work group have been shown to affect their willingness to share knowledge within that group (Lin 2007; Kelly 2010). We expect that individuals with higher group identity will generally be more likely to share accurate information with their colleague. To measure group identity (i.e., *Group Identity*), we ask participants five questions adapted from Hogg and Hains' (1996) group identification scale. *Group Identity* is not significantly correlated with either of the two independent factors (both $p > 0.26$).[16,17]

[13] To ensure equivalent compensation magnitudes across the *Flat Wage* and *Individual Incentives* conditions, we ran a pilot test and set our pay parameters such that $14, the flat wage compensation = $10 + ($0.02 × average pilot test performance).

[14] A third independent variable, information framing (gain/loss), was manipulated in the study. In the gain condition, participants gained performance score points for correctly identifying correct directions at each decision point. In the loss condition, participants lost performance score points for failing to correctly identify correct directions at each decision point. This variable is not statistically significant in any of the analyses and is not included in the models presented. Therefore, we find evidence that our results are robust to either gain or loss information framing. For the remainder of the paper we combine the gain and loss conditions in our discussion and analysis.

[15] The decision either to share inaccurate information or to withhold accurate information is mutually exclusive at each decision point, allowing us to combine these actions into a single variable.

[16] Before using the group identity scale in the following analyses, we examine the reliability of the scale used. All five factor loadings were greater than 0.65 and the five items load on one factor 80.59 percent of the variance. Further, the Cronbach's alpha for the scale is acceptable at 0.93 (Diekhoff 1992). Therefore, we calculate a mean score across these five items as our measure of group identity.

[17] Excluding the group identity covariate does not change the inferences of the hypotheses tests reported in the Results section.

IV. RESULTS

Participants

A total of 248 undergraduate students from a business program at Wilfrid Laurier University participated in our study. On average, participants earned $14.00 for participating in the study.[18] Participants ranged from first year to fourth year undergraduate students, with 92 percent of students in their third or fourth year of study.[19] Student participants are appropriate for this study because we are examining the effects of RPI and incentive pay on counterproductive knowledge sharing behaviors using a relatively simple task for which no previous management or specific work-related experience is required.

Tests of Hypotheses

To test H1 and H2, we conduct an analysis of covariance and a test of planned contrasts as follows. First, we begin with an analysis of covariance where the dependent variable is *Counterproductive Behavior*, the independent variables are *RPI* and *Incentives,* and the covariate is *Group Identity*. A higher measure for the *Counterproductive Behavior* variable corresponds to a lower level of knowledge sharing. In H1, we posit that individuals provided with RPI share knowledge less frequently (i.e., engage in more counterproductive behavior) than individuals not provided with RPI. The analysis of covariance, as reported in Table 1, Panel B, provides evidence consistent with H1. Results indicate a significant main effect of *RPI* ($F = 6.84$, $p < 0.01$, one-tailed) on *Counterproductive Behavior*.[20,21] Consistent with our expectations, participants in the *RPI Present* condition engaged in counterproductive behavior significantly more frequently (3.71, see Table 1, Panel A) than those in the *RPI Absent* condition (2.73, $t = 1.65$, $p = 0.05$, one-tailed, not tabulated). Therefore, we find some support for H1. Individuals share less knowledge when provided with RPI.

However, additional analysis reveals that the effect of *RPI* on *Counterproductive Behavior* occurs when *Individual Incentives* are present, but not when *Individual Incentives* are absent. Planned comparisons provide evidence that, in the *Individual Incentives Present* condition, the difference between *RPI Present* (4.14) and *RPI Absent* (2.67) is significant (Table 1, Panel D: $p = 0.01$, one tailed); however, the difference is not significant when comparing the *Individual Incentives Absent* conditions (*RPI Present* = 3.23, *RPI Absent* = 2.79, $p = 0.19$, one-tailed). Therefore, we find partial support for H1. We examine the effects of individual incentives on counterproductive behavior more closely in testing H2.

H2 predicts that individuals engage in the most counterproductive knowledge sharing behavior when they receive RPI and receive individual incentive compensation. The analysis of covariance (Table 1, Panel B) shows a marginally significant interaction between *RPI* and *Incentives* ($F = 1.81$, $p = 0.09$, one-tailed). Consistent with our expectations, planned comparisons (Table 1, Panel D) show that participants in the *RPI Present, Individual Incentives Present* condition engage in *Counterproductive Behavior* (4.14) more than those in the *RPI Present, Individual Incentives Absent* condition (3.23, $p = 0.05$, one-tailed), individuals in the *RPI Absent, Individual Incentives Absent* condition (2.79, $p = 0.01$, one-tailed) and individuals in the *RPI Absent, Individual Incentives Present* condition (2.67, $p = 0.01$, one-tailed). To test H2, we estimate a planned contrast, as shown in Table 1, Panel C, that relies on weights of −3, 5, −3, 1, where the *RPI Present, Individual Incentives Present* condition has a weight of 5; *RPI Present*, *Individual Incentives Absent* has a weight of 1; and all other conditions have a weight of −3.[22] This weighting reflects the *a priori* predictions of both H1 and H2. The planned contrast is significant (Table 1, Panel C: $t = 1.77$ $p = 0.04$, one-tailed).[23] Therefore, we find evidence to support H2: that individual incentive compensation will

[18] Participants completed the maze with an average of 225 points, and the colleague completed the maze with an average of 320 points. The colleague's score increased when the participant engaged in productive behavior and shared their knowledge of the correct directional decision with the colleague because knowledge sharing helped the colleague find the correct direction on the first attempt. Given that the participants were able to assist the colleague find the correct directions more quickly (than when the participant was left to guess at the correct direction), it makes sense that the colleague's average score is higher than the average participant score.

[19] Other variables were measured during the experiment, including participants' academic experience and industry experience. In all cases, these demographic variables are not different on average between experimental conditions (not tabulated) and do not affect the reported results so we have not included them in our hypothesis tests.

[20] Sixty-two percent of participants engaged in counterproductive behavior at least once in the ten opportunities to share information with the peer available in this experiment. The frequency of counterproductive behavior ranged from 1 to 10 times over the course of the experiment. The minimum observation in the sample is 0; the 25th percentile is 0; the median is 2; the 75th percentile is 6, and the maximum is 10.

[21] Consistent with our expectations, the greater the extent to which individuals feel *Group Identity* negatively impacts the frequency of *Counterproductive Behavior* ($F = 96.59$, $p < 0.01$, one tailed, Table 1, Panel B).

[22] Similar patterns of contrast coding (e.g., −2, 3, −2, 1; and −1, 1.5, −1, 0.5) provide similar results, untabulated (Buckless and Ravenscroft 1990). Similar results also emerge when we employ an alternative contrast coding of −1, 3, −1, and −1 ($t = 1.50$, $p = 0.07$, one-tailed, not tabulated) (Guggenmos, Piercey, and Agoglia 2017).

[23] The insignificance of the semi-omnibus F-test on the residual between cells variance ($F = 0.01$, $p = 0.98$) and the residual between cells effect size ($q^2 = 0.01$) indicates that only a limited amount of residual between cells effects remain after accounting for the contrast (Guggenmos, Piercey, and Agoglia 2017).

TABLE 1

The Effect of Relative Performance Information (RPI)[a] and Incentive Pay[b] on Counterproductive Knowledge Sharing Behavior[c]

Panel A: Descriptive Statistics: Least Square Means, (Standard Error), Number of Observations

	RPI Absent	*RPI Present*	Average
Individual Incentives Present	2.67	4.14	3.40
	(0.37)	(0.37)	(0.26)
	64	64	128
Individual Incentives Absent	2.79	3.23	3.03
	(0.38)	(0.37)	(0.37)
	58	62	120
Average	2.73	3.71	
	(0.27)	(0.26)	
	122	126	

Panel B: Analysis of Covariance. Dependent Variable: *Counterproductive Behavior*

	df	F	p-value (one-tailed)
Intercept	1	272.41	< 0.01
RPI	1	6.84	< 0.01
Individual Incentives	1	1.05	0.16
RPI × *Individual Incentives*	1	1.81	0.09
Group Identity	1	96.59	< 0.01
Error	243	11.85	

Panel C: Results of ANOVA, Contrast Model (H1, H2). Dependent Variable: *Counterproductive Behavior*

	df	t	p-value (one-tailed)
RPI and *Individual Incentives*	244	1.77	0.04

Contrast Weights: (B = 5, A = −3, D = 1, C = −3).

Panel D: Planned Comparisons. Dependent Variable: *Counterproductive Behavior*

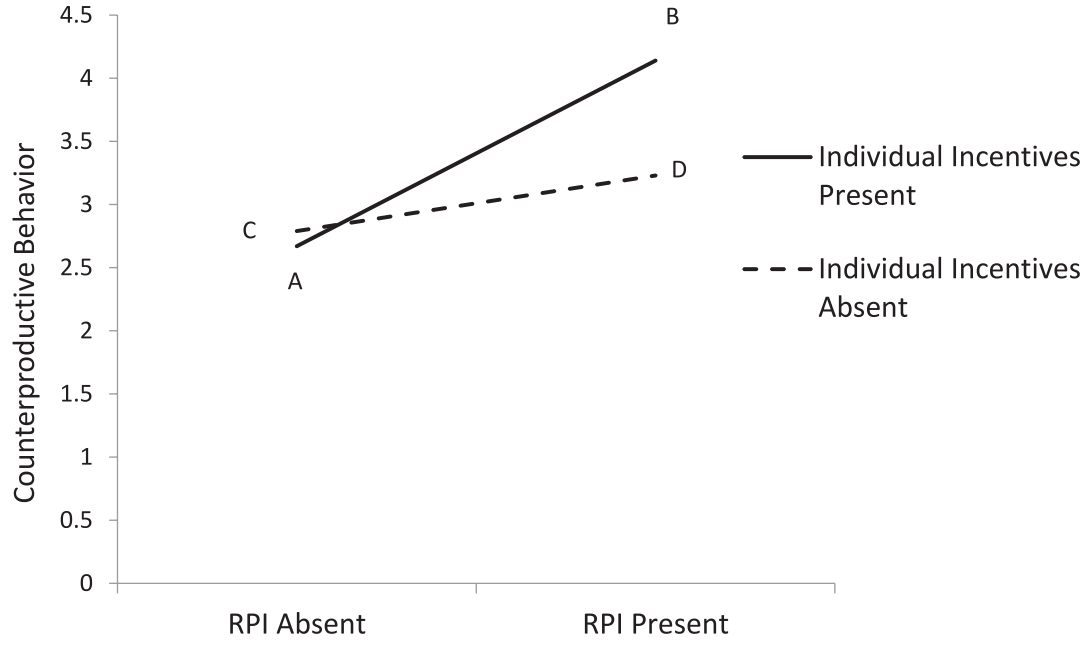
	p-value (one-tailed)
Individual Incentives Present:	
RPI Present versus *RPI Absent* (B > A, Figure 2)	0.01
Individual Incentives Absent:	
RPI Present versus *RPI Absent* (D > C)	0.19
RPI Present:	
Individual Incentives Present versus *Individual Incentives Absent* (B > D)	0.05
RPI and *Individual Incentives Present* versus *RPI* and *Individual Incentives Absent* (B > C)	0.01

[a] *RPI* is manipulated as either present or absent. In the *RPI Present* condition participants received information on their performance relative to other members in their group. In the *RPI Absent* condition participants did not receive information on their performance relative to other members in their group.

[b] Individual Incentives is manipulated as either present or absent. In the *Individual Incentives Present* condition participants were paid a flat wage of $10 plus an additional $0.02 per point of their performance score. In the *Individual Incentives Absent* condition participants were paid a flat wage of $14.

[c] Counterproductive knowledge sharing behavior is calculated as the number of times participants do not share directional information with the colleague (passive counterproductive behavior) or share inaccurate information with the colleague (active counterproductive). The maximum value is 10; the actual range is 0–10.

FIGURE 2
Observed Effects of Relative Performance Information (RPI) and Individual Incentives on Counterproductive Knowledge Sharing Behavior



This figure depicts the actual pattern of individuals' counterproductive behavior.

increase counterproductive knowledge sharing behavior when RPI and individual incentives are both present. Our results appear in Figure 2.

Forms of Counterproductive Knowledge Sharing Behavior (RQ1)

Our research question asks whether the pattern of results predicted for counterproductive knowledge sharing behavior is consistent over both *active* and *passive* counterproductive behaviors. We observe individuals engaging in both *active* and *passive* counterproductive behavior in all conditions.[24] To explore the research question we analyze *active* and *passive* counterproductive behavior separately. Table 2, Panel A provides descriptive statistics for the two forms of counterproductive behavior.

Active Counterproductive Behavior

To determine whether RPI affects active counterproductive behaviors in a knowledge sharing setting where passive counterproductive behavior is also available, we conduct an analysis of covariance where the dependent variable is *Active Counterproductive Behavior*, the independent variables are *RPI* and *Incentives,* and a covariate is *Group Identity*.[25] Results presented in Table 2, Panel B, show that *RPI* has a significant effect on *Active Counterproductive Behavior* ($F = 5.51$, $p = 0.01$, one-tailed).[26] Descriptive statistics indicate that individuals in the *RPI Present* conditions (0.49, see Table 2, Panel A) engage in

[24] We observe that significantly more individuals (46 percent of participants) engaged in *only* passive counterproductive behaviors than in *only* active counterproductive behaviors (7 percent of participants; $\chi^2 = 69.82$, $p < 0.01$) or in *both* active and passive counterproductive behaviors (9 percent of participants, $\chi^2 = 60.45$, $p < 0.01$). Significantly more individuals (46 percent of participants) engaged in *only* passive counterproductive behaviors than no counterproductive behavior at all (38 percent of participants, $\chi^2 = 2.13$, $p = 0.07$, one-tailed).

[25] Forty-one participants (i.e., 16 percent of participants) engaged in active counterproductive knowledge sharing behavior at least once in the experiment: 61 percent of these participants engaged in active counterproductive behavior once with the peer, 27 percent of these participants engaged in active counterproductive behavior two or three times with the peer, and 12 percent of these participants engaged in active counterproductive behavior four or more times with the peer. The number of times participants shared inaccurate information ranged from 0 times to 8 times.

[26] Consistent with our expectations, the extent individuals feel *Group Identity* negatively impacts the frequency of A*ctive Counterproductive Behavior* ($F = 4.71$, $p = 0.02$, one tailed, Table 2, Panel B).

TABLE 2

The Effect of Relative Performance Information (RPI)[a] and Individual Incentives[b] on Active and Passive Counterproductive Behaviors[c]

Panel A: Descriptive Statistics: Least Square Means, (Standard Error), Number of Observations

	Active Counterproductive Behavior			*Passive Counterproductive Behavior*		
	RPI Absent	***RPI Present***	**Average**	***RPI Absent***	***RPI Present***	**Average**
Individual Incentives Present	0.19	0.37	0.28	2.48	3.77	3.12
	(0.13)	(0.13)	(0.09)	(0.37)	(0.37)	(0.27)
	64	64	128	64	64	128
Individual Incentives Absent	0.17	0.60	0.39	2.62	2.66	2.64
	(0.13)	(0.13)	(0.10)	(0.39)	(0.38)	(0.27)
	58	62	120	58	62	120
Average	0.18	0.49		2.55	3.22	
	(0.09)	(0.09)		(0.27)	(0.27)	
	122	126		122	126	

Panel B: Analysis of Covariance: Dependent Variable: *Active Counterproductive Behavior*

	df	**F**	**p-value (one-tailed)**
Intercept	1	17.49	< 0.01
RPI	1	5.51	0.01
Individual Incentives	1	0.61	0.22
RPI × *Individual Incentives*	1	0.94	0.16
Group	1	4.71	0.02
Error	243	1.08	

Panel C: Analysis of Covariance: Dependent Variable: *Passive Counterproductive Behavior*

	df	**F**	**p-value (one-tailed)**
Intercept	1	17.49	< 0.01
RPI	1	3.06	0.04
Individual Incentives	1	1.64	0.10
RPI × *Individual Incentives*	1	2.75	0.09
Group	1	79.01	< 0.01
Error	243	1.08	

[a] *RPI* is manipulated as either present or absent. In the *RPI Present* condition participants received information on their performance relative to other members in their group. In the *RPI Absent* condition participants did not receive information on their performance relative to other members in their group.

[b] *Individual Incentives* is manipulated as either present or absent. In the *Individual Incentives Present* condition participants were paid a flat wage of $10 plus an additional $0.02 per point of their performance score. In the *Individual Incentives Absent* condition participants were paid a flat wage of $14.

[c] *Active Counterproductive Behavior* is calculated as the number of times participants share incorrect directional information with the colleague. The maximum value is 10, the actual range is 0–8. *Passive Counterproductive Behavior* is calculated as the number of times participants do not share directional information with the colleague. The maximum value is 10; the actual range is 0–10.

Active Counterproductive Behavior significantly more frequently than those in the *RPI Absent* conditions (0.18, $t = 2.16$, $p = 0.01$, one-tailed, not tabulated). Consistent with findings in the previous literature (Charness et al. 2014; Wang 2017) we find that *RPI* increases the frequency with which individuals engage in *Active Counterproductive Behavior*. Planned comparisons indicate that in the *RPI Present* condition, *Active Counterproductive Behavior* is significantly more frequent in the *Individual Incentives Absent* (0.60) condition than the *Individual Incentives Present* (0.37, $p = 0.04$, one tailed, not tabulated) condition. Therefore, we find evidence that, in a setting where individuals receive RPI, they more frequently engage in active counterproductive knowledge sharing behaviors when individual incentives are not available than when individual incentives

are available. Individuals may engage in active counterproductive knowledge sharing behaviors less frequently in a setting where individual incentives are provided because individuals are sensitive to the cost of their counterproductive knowledge sharing behaviors on the other party (Gneezy 2005). Thus, it is plausible that when individual incentives are provided, individuals are less willing to share inaccurate information with their colleague because they worry that doing so will have a direct, negative impact on their colleague's wages.

Passive Counterproductive Behavior

Next, we examine how RPI and individual incentives affect passive counterproductive behaviors in a knowledge sharing setting.[27] We conduct an analysis of covariance where the dependent variable is *Passive Counterproductive Behavior*, the independent variables are *RPI* and *Incentives,* and a covariate is *Group Identity*. Results presented in Table 2, Panel C, show that *RPI* has a significant effect on *Passive Counterproductive Behavior* ($F = 3.06$, $p = 0.04$, one-tailed, Table 2, Panel C).[28] Descriptive statistics indicate that individuals in the *RPI Present* conditions (3.22, see Table 2, Panel A) more frequently engage in *Passive Counterproductive Behavior* than those in the *RPI Absent* conditions (2.55, $t = 1.76$, $p = 0.04$, one-tailed, not tabulated). Planned comparisons also indicate that individuals in the *RPI Present*, *Individual Incentive Present* condition engage in more *Passive Counterproductive Behaviors* (3.77) than individuals in the *RPI Present, Individual Incentives Absent* condition (2.66, $p = 0.02$, not tabulated). Thus, consistent with our findings in the hypothesis testing, we find evidence that, when RPI is provided, individuals assigned individual incentive contracts more frequently engage in passive counterproductive knowledge sharing behavior.

Therefore, we find evidence that RPI increases the frequency with which individuals engage in both active and passive counterproductive behavior. However, when RPI is present, we find evidence that rewarding individual incentives increases the frequency of passive counterproductive behavior and decreases the frequency of active counterproductive behavior.

Supplemental Analysis: Robustness Tests

Likelihood and Frequency of Counterproductive Behavior

In this section, we consider how our manipulations affect the likelihood that individuals engaged in counterproductive knowledge sharing behavior. In keeping with our theory used in the development of H1, we expect that RPI will increase the likelihood that individuals will engage in *Counterproductive Behavior*. To determine whether *RPI* increases the likelihood of counterproductive behavior, we create a new variable where *Likelihood* $= 1$ when *Counterproductive Behavior* > 0 and *Likelihood* $= 0$ when *Counterproductive Behavior* $= 0$. We conduct a logit regression where *Likelihood* is the dependent variable and *RPI, Incentives, RPI* $\times$ *Incentives,* and *Group Identity* are the dependent variables. In this model, *RPI* positively associates with *Counterproductive Behavior* (Wald Chi-Square $= 5.74$, $p < 0.01$, not tabulated).[29] Consistent with our expectations, we find evidence that RPI increases the likelihood that individuals engage in counterproductive knowledge sharing behavior.

Next, we consider how our manipulations affected the frequency with which individuals engaged in counterproductive knowledge sharing behavior. We examine only participants that engaged in counterproductive knowledge sharing behavior at least once, but less than ten times ($n = 136$), to test the robustness of our results to the elimination of individuals who engage in counterproductive behavior at none or all of the decisions points. We perform an analysis of covariance test where the dependent variable is *Counterproductive Behavior* (i.e., participants' failure to share knowledge, which includes failing to share knowledge and sharing inaccurate knowledge), the independent variables are *RPI* and *Incentives,* and the covariate is *Group Identity*.[30] In this model, the interaction of *RPI* $\times$ *Incentive* is significant ($F = 2.27$, $p = 0.07$, one tailed, not tabulated).[31] The pattern of results observed is similar to those reported in the main analysis. When *Individual Incentives* were provided, individuals in the *RPI Present* condition engaged in more *Counterproductive Behavior* (mean $= 4.8$) than those in the *RPI*

[27] Fifty-five percent of participants (i.e., 137 participants) engaged in passive counterproductive behavior at least once in the experiment: 55 percent of these participants engaged in passive counterproductive behavior five, or fewer, times while 45 percent of these participants engaged in passive counterproductive behavior with the peer more than five times. Overall, the number of times participants engaged in passive counterproductive behavior over the ten decision points ranged from 0 times to 10 times.

[28] Consistent with our expectations, the greater the extent individuals feel *Group Identity* negatively impacts the frequency of *Passive Counterproductive Behavior* (79.01, $p < 0.01$, one tailed, Table 2, Panel C).

[29] In this model, *Group Identity* is associated with *Counterproductive Behavior* (Wald Chi-Square $= 31.72$, $p < 0.01$, two-tailed, not tabulated), but *Incentives* and *RPI* $\times$ *Incentives* are not (p-values > 0.48, two-tailed).

[30] In total 136 observations are included in this sample. The minimum observation in the sample is 1; the 25th percentile is 2; the median is 4; the 75th percentile is 6.75; and the maximum is 9.

[31] In this model, *Group Identity* is positively associated with *Counterproductive Behavior* ($F = 34.39$, $p < 0.01$, two-tailed, not tabulated), but the main effects of *Individual Incentives* and *RPI* are not (p-values > 0.58, two-tailed).

Absent condition (mean = 4.4, p = 0.05, one-tailed, not tabulated). Moreover, in the *RPI Present* conditions, individuals in the *Individual Incentives Present* condition engaged in more *Counterproductive Behavior* (mean = 4.8) than those in the *Individual Incentives Absent* condition (mean = 4.0 p = 0.05, one-tailed, not tabulated).[32]

Counterproductive Behavior Over Time

To determine if participants engaged in counterproductive knowledge sharing behavior differently over the ten decision points, we perform a repeated measures, multivariate analysis of variance where the within subjects, repeated measure is *Counterproductive Behavior* at each of the *Decision Points,* and *RPI* and *Incentives* are the between subjects factors. The significance of *Decision Points* ($F = 5.09$, $p < 0.01$, two-tailed, not tabulated) shows that, over time, participants more frequently engage in counterproductive knowledge sharing behavior. For example, in the first half of the simulation the average *Counterproductive Behavior* (*Decision Points* 1–5, mean = 1.47, not tabulated) is significantly less than the average counterproductive behavior in the last half of the experiment (*Decision Points* 6–10, mean = 1.62 p = 0.05, one tailed, not tabulated). The insignificance of the interaction of *Decision Points* with *Incentives* ($F = 1.07$, $p = 0.38$, two-tailed, not tabulated) and *RPI* ($F = 0.93$, $p = 0.50$, two-tailed, not tabulated) indicates that counterproductive behavior does not vary over time differently depending on the *Incentives* or *RPI* conditions.

V. DISCUSSION AND CONCLUSION

In this study, we draw on social comparison theory and monetary priming to hypothesize the effect of RPI and incentive pay on counterproductive behavior in a knowledge sharing setting. Social comparison theory posits that individuals strive to outperform others (Festinger 1954; Frederickson 1992). When RPI is provided, it heightens individuals' desire to compete and perform relatively better than their colleagues. Monetary priming research argues that in the presence of money, specifically when offered monetary incentives, individuals will frame their decisions as a competitive decision and not a social interaction (Fiske 1992; Kouchaki et al. 2013; Vohs et al. 2008) causing a reduction in cooperation with others. We hypothesize and find evidence that participants receiving RPI engage in counterproductive knowledge sharing behavior more than those not receiving RPI. We also hypothesize and find that the presence of RPI and individual incentive magnifies this effect and results in the highest frequency of counterproductive knowledge sharing behavior.

We provide insights into individuals' willingness to engage in active and passive counterproductive behavior when both are available options and find that the choice to use either of these methods is not symmetrical. Although RPI increases the use of both active and passive forms of counterproductive behavior, the presence of individual-based incentives for personal performance increases passive counterproductive behavior, but decreases active counterproductive behavior. This is consistent with the reduced feeling of regret associated with an inaction causing harm compared to an action causing harm (Kahneman and Tversky 1982; Landman 1987). Although active counterproductive behavior is often more costly than passive counterproductive behavior, organizations should be concerned with the possible loss of productivity caused by passive behavior since individuals can engage in it more easily, and it is not easily identified. Organizations may benefit from including a formal request to share knowledge in their controls when knowledge sharing is important to reduce the frequency of passive counterproductive behavior.

This study contributes to accounting research and practice in several ways. First, this study's primary contribution to the performance measurement literature is that RPI and individual performance incentive contracts jointly decrease the likelihood that individuals will share accurate knowledge with others. Instead, individuals engage in counterproductive behaviors that may hinder their colleagues' performance. While previous research shows that RPI increases counterproductive behavior under a flat-wage incentive system (Charness et al. 2014) and under an individual performance system tied to relative performance (Wang 2017), our study supports their findings and is the first to test the interactive effect of relative performance and an individual performance-based incentive system. Prior studies suggest that the combination of these factors leads to high effort and performance (Hannan et al. 2008; Sprinkle 2003; Tafkov 2013). However, our results show that when individuals receive RPI and are rewarded individual performance-based incentives, they are most likely to engage in counterproductive knowledge sharing behavior

Second, we extend recent research that examines counterproductive behavior within organizations by examining individuals' choice to use active and passive counterproductive behavior. Active counterproductive behavior, such as lying to a

[32] Results (not tabulated) indicate that individuals in the *RPI Absent* and *Individual Incentives Absent* condition engage in a high level of counterproductive behavior (mean = 4.8). Importantly, this condition includes the highest number of individuals who chose not to engage in any counterproductive behavior. These observations are not included in the sample used in this analysis and as a result a high level of counterproductive behavior is observed.

colleague or sabotaging their production, may be more costly to the firm than passive counterproductive behavior, such as withholding information or slowing down their production process, however individuals may be more likely to engage in passive counterproductive behavior. Organizations may benefit from considering the differential costs of active and passive counterproductive behaviors.

As with most experimental research, there are potential limitations of our study, which provide opportunities for future research. Knowledge can be broken into tacit knowledge, defined as "know how," and explicit knowledge, defined as "know-what" (Polanyi 1966; Vera-Muñoz et al. 2006). Prior research suggests that individuals may be more likely to share explicit knowledge (e.g., general information or knowledge) than tacit knowledge (e.g., influential knowledge or job tips) due to greater time and effort needed to share tacit knowledge (Hau et al 2013). In our setting, individuals share technical knowledge and do not incur any cost to share their knowledge with a colleague, as would generally be the case for tacit knowledge. We chose a no-cost setting to minimize the barriers for individuals to share. The cost of knowledge sharing has been shown to influence sharing behavior and interact with individual and control features' effects on knowledge sharing (e.g., Bol and Leiby 2015). Future research would benefit from examining how a cost of knowledge sharing is likely to affect passive and active counterproductive behavior, especially when such a cost exists regardless of whether the shared knowledge is true or false.

The setting used in the study was void of any incentive for sharing inaccurate knowledge with other employees, yet participants still engaged in this destructive behavior. Further exploration as to the nature and extent of this behavior will add to our understanding of the appropriateness of control activities in firms where knowledge sharing is vital to firm performance (e.g., professional service firms, consulting firms). In our study, the colleague always accepted and acted on the advice provided by the participant. Future research could examine how the decision of the colleague to accept, or not accept, the knowledge shared affects the sharer's behavior.

Our study examined the presence of individual financial incentives on individuals' counterproductive knowledge sharing behavior. Given that research shows that both financial and nonfinancial incentives can impact individuals' behavior (e.g., Evans, Hannan, Krishnan, and Moser 2001), future research would benefit from examining the effect of nonfinancial incentives on counterproductive behavior. Finally, in our study, participants had no prior knowledge or expertise with our maze task. Future research would benefit from examining the effects of RPI and individual incentives on knowledge sharing in a setting where the knowledge sharer and knowledge receivers have different levels of expertise, such as a subordinate-superior relationship.

Notwithstanding these limitations, our study provides evidence that individuals receiving RPI are more likely to use their knowledge to engage in counterproductive behavior. Further, we find evidence that the presence of individual monetary incentives and RPI magnifies this increase in counterproductive behavior. While we observe that RPI increases the frequency of both active and passive counterproductive behaviors, we find that passive counterproductive behavior is more frequent when individual performance-based incentives are present while active counterproductive behavior is more frequent when individual performance-based incentives are absent.

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