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RESEARCH

# Fraud and games? The impact of communication on occupational fraud, evidence from field experiments

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This research investigates the role of organizational communication in mitigating occupational fraud, with a particular emphasis on asset misappropriation. It systematically compares the perceived effectiveness of whistleblowing mechanisms against internal audits. Utilizing an experimental methodology grounded in game theory and the theoretical framework of Common Pool Resources (CPRs), the study implements a controlled sales-skimming game to empirically observe behavioral responses to varying governance structures. Results indicate that communication significantly attenuates fraudulent behavior irrespective of the strength of internal controls. Moreover, whistleblowing mechanisms are perceived by participants as more effective deterrents than traditional internal audit functions, resulting in lower instances of fraud. Critically, this study introduces a novel conceptualization by challenging the dominant agency theory paradigm, which traditionally frames occupational fraud through the lens of principal-agent conflicts. Instead, it advances the perspective of the organization as a CPR—subject to collective action problems and vulnerable to opportunistic depletion. By applying CPR theory to the organizational context, the research highlights that fraud prevention should be reconceptualized not solely as a matter of monitoring and aligning incentives, but as the governance of shared organizational resources susceptible to 'tragedy of the commons' dynamics. This theoretical shift provides a new foundation for developing anti-fraud strategies that integrate collective stewardship principles alongside traditional control mechanisms.

**Keywords:** occupational fraud, asset misappropriation, whistleblowing programs, common pool resources, game theory, internal control mechanisms, communication, internal audit

## Introduction

Occupational fraud takes many shapes and forms. It can be something as trivial as stealing money from the till in a shop at the end of the day or artful window dressing of balance sheet accounts to complex transactions on financial markets likely to lead major corporations to bankruptcy. The Association of Certified Fraud Examiners (ACFE) defines occupational fraud as the use of one's occupation for personal enrichment or gain through the purposeful misuse of the company's assets or resources (1). This definition coincides with the work of Friedrichs (2) and Albrecht et al. (3), although the term *occupational crime* may also be used to refer to this phenomenon (4). In general, the ACFE classifies occupational fraud in three main categories: corruption, asset misappropriation, and fraudulent statements. While occupational fraud schemes are ubiquitous and may be more or less complex, they all share a set of common features: the fraud scheme is concealed, the perpetrator violates his fiduciary duties to the organization, and the deed is committed for the purpose of direct or indirect financial benefit to the perpetrator, to the detriment of the employing organization.

Within this body of literature, misappropriation of assets is the most common form of occupational fraud, although it is not an area that has received enough academic research compared with financial statement fraud (5). The misappropriation may involve cash or non-cash assets, and it can occur in different circumstances. Assets and company resources may be misappropriated during the process of acquiring goods or services, before they are registered in the records of an organization, or while being accounted for by the organization (3). In the case of sales skimming, which is the category of occupational fraud we have selected for our experimental design, sales are stolen from the organization even before these are recorded in the company's books or registers.

Asset misappropriation cases are more common than bribery or corruption and financial reporting fraud. In their 2020, 2022, and 2024 Global Economic Crime Survey, PricewaterhouseCoopers (PwC) reported that asset misappropriation cases continue to be among the top 3 biggest threats to organizations (after cyberattacks and customer fraud), while the 2024 ACFE Report to the Nations estimated that this type of fraud is representing 89% of the cases reported. The direct financial costs for companies (excluding reputation damage, cost of remediation, and legal costs) have an estimated median loss for known schemes amounting to $120,000 per case. In contrast to financial statement fraud, asset misappropriation may occur in all areas of a given organization, and it may be perpetrated by individuals without particular technical skills or at any level of the corporate ladder. In a case of asset misappropriation, the fraudster is faced with strategic choices as he strives to commit the forfeit without being detected. In this study, we find that (i) the fates of the organization and the perpetrator are interlinked; (ii) the perpetrator chooses a strategy to increase his wealth; (iii) the notion of deceit and concealment can be assimilated to a situation with asymmetrical information; and (iv) the outcome of the fraud can result in a financial gain for the perpetrator and a loss for the organization, a situation that brings back to mind the features of a strategic game, as defined by the researchers in the field of game theory (6, 7).

Our paper makes several contributions towards the understanding of asset misappropriation within an organization. First, it highlights the key role that communication plays in a fraud scenario and how it can impact the decision-making process that occurs when an employee contemplates whether to engage in a fraudulent activity or not. Secondly, through the analysis of the behaviors displayed by the participants, we could demonstrate that employees have a different perception of the efficiency of control mechanisms, and in particular the fact that a whistleblowing program is, in their views, significantly more efficient than a more classic method such as an internal audit. As described by multiple studies, the perception of the strength and the efficiency of control mechanisms is a fundamental aspect explaining the occurrence of occupational fraud (4, 8–10).

This paper is organized as follows. We first offer a literature review of the occupational fraud phenomenon and common anti-fraud mechanisms. We then introduce a theoretical framework that can enable us to analyze the phenomenon of occupational fraud, and we formulate our research hypothesis. Subsequently, we present our research methodology using an experimental approach. Finally, we offer an interpretation of our results, the insights gathered through experimental findings, implications, limits of this work, and suggestions for future research.

# Literature review

## Overview of occupational fraud and fraud prevention mechanisms

Over the past 40 years, a number of professional organizations, public bodies, and academics have embarked on surveys to study the phenomenon of occupational fraud. One can refer to Albrecht's studies on the motivation of fraudsters (11, 12), the seminal survey from Hollinger and Clark on employee thefts (8), and the periodic practitioner surveys from the ACFE, Kroll, credit industry fraud avoidance system (CIFAS), and the "Big Four" (the main global public accounting firms in the world: Deloitte, PwC, Klynveld Peat Marwick Goerdeler [KPMG], and Ernst & Young). Although approaching the topic of occupational fraud from different angles, these works tend to provide a set of recommendations and statistics on the main prevention and detection techniques. Studies provided from 2002 to 2024 by practitioners highlight the prevalence of controls' types, and detection techniques across all industries (13–23).

At the top of the lists, a key component of the anti-fraud mechanisms is generally the development of accounting procedures, frequent accounting reconciliations and financial analysis, audits (internal and external), physical security, background checks, segregation of duties, information security measures, and more recently, data mining and data analytics. According to the Certified General Accountants Association of Canada (16), 86% of the companies surveyed are concerned by asset misappropriation. Similarly, Kroll, in a worldwide study realized in 2023, highlights asset misappropriation (including intellectual property theft) as one of the major threats, with information technology (IT) security measures and internal and external audits as methods for internal fraud prevention or detection being commonly used (24).

The ACFE results reported from 2012 through 2024 are in line with PwC' findings: most companies declare that audits are generally leveraged to detect and prevent fraud. Asset protection and security techniques are also relied upon to prevent and detect fraud. They range from physical security

measures (asset tags, alarms, secure premises, CCTV, and physical access controls) to sophisticated cybersecurity and intruder detection systems to protect intangible assets data and in general information systems.

Segregation of duties and employee screening are commonly referenced in fraud studies by respondents listing the processes in place to help protect the organization against the threat of occupational fraud (13). The principle of embedding sound segregation of duties across all areas of the organization lies in the fact that individuals would not be able to complete an end-to-end process without another individual intervening either to complete the process, approve it, validate it, or review it (25). Ultimately this results in fewer opportunities for a fraudster to go undetected. Employee screening, on the other hand, is more a preventative control. Organizations select their employees according to certain criteria, and by conducting background checks, they avoid hiring individuals of poor character.

Approaches involving other employees and fostering higher ethical standards and hotlines or anonymous reporting lines are generally ranked below all the other methods previously presented. This is consistent in the surveys from KPMG in Australia and New Zealand conducted in 2012 and with the ACFE global surveys conducted every 2 years since 1996. From a regulatory perspective, while in the USA the Sarbanes-Oxley act requires all listed companies to implement a whistleblower mechanism since 2002, in Europe, the European Parliament adopted the European Union (EU) Whistleblowing Directive only in 2019, with most of the member states failing to meet the December 2021 transposition deadline. While progress has been seen in 2023, 2024, and 2025, this directive still remains very new.

Private organizations around the world appear not to have grasped the importance of key elements such as whistleblowing programs, employee training programs, or strong ethical corporate culture signaling. Displaying a zero-tolerance attitude towards fraud and abuse and disseminating a clear message constitute powerful deterrents (26). The lack of a strong culture and insufficient visible measures, on the contrary, may be seen as a laissez-*faire* attitude.

As emphasized by the findings of the research conducted by Button in a comparative analysis of fraud prevention methods (27), although whistleblowing programs and hotlines are frequently recommended by practitioners, there is still limited academic research looking into the efficiency of such controls.

Sophisticated indicators, data analytics, and security measures may be in place, and external control mechanisms such as audits may be deployed, but if employees within an organization don't share strong ethical values, they may not be willing to question or report unethical behavior, and fraud may continue to go undetected. As many surveys point out, "tips" or reports from employees continue to be the most frequent detection methods of occupational fraud in organizations (ACFE Report to the Nations, 2012) (28–32). Communication and interactions between economic actors within the organization are therefore preeminent aspects in the study of the asset misappropriation phenomenon. Transparent and well-disseminated internal procedures and fraud awareness programs contribute to the adherence to rules while clearly designating unacceptable behavior that needs to be reported. Individuals observing ethical behavior amongst their peers will be less inclined to violate the socially accepted behavior and will be reluctant to engage in fraudulent activities.

## The company seen as a common pool resource (CPR)

In 1953, Cressey conducted a breakthrough study in the field of economic crime (33). He interviewed over 200 convicted embezzlers in prison over the course of 3 years. From the data collected through interviews, Cressey elaborated a model known as "the fraud triangle," which stipulates that financial pressure, opportunity, and rationalization are the three key factors that in combination lead to fraud in organizations. While the limits of the fraud triangle have been highlighted (34) and the model refined (35), to this day, this model remains one of the conceptual pillars utilized by criminologists and professional organizations to analyze the phenomenon of internal fraud, and in particular, misappropriation of assets.

Although the fraud triangle is a powerful conceptual tool, we feel that the intricacies at play in such a scenario require a larger framework where various layers of analysis are present. We propose to study occupational fraud through the lenses of an Institutional Analysis and Development (IAD) framework, as per the terminology of Ostrom (36).

A company may be perceived as a bundle of CPR (37). As such, each employee can be both an appropriator and a provider of the common resource. On the one hand, employees bring to the company their work, their creativity, energy, problem-solving skills, and their commitment. On the other hand, they also benefit from a regular income, bonuses, benefits, a sense of belonging, a status, and an identity. Employees have concurring and opposing self-centered interests. When members of an organization misappropriate assets, and as such appropriate much more than their "fair" share of the common resource, the survival of the company may be compromised, as misappropriation cases of significant magnitude can lead to bankruptcy. In other words, they may lead to the depletion of the CPR. This negative outcome, frequently observed, is referred to as "the tragedy of the commons" (38).

Ostrom's research led her to observe communities able to preserve a shared resource in the long run without external regulation and contradicting the ominous predictions of the classic economic theories (39). She emphasizes that collective

action behaviors emerging in a CPR dilemma require several levels of analysis to truly comprehend their main features and their level of resilience. Cooperation can indeed emerge, and self-regulated institutions may develop within a group, thus leading to a collective positive outcome.

In a company, where divergent interests also coexist (competition), leveraging the IAD framework can be an interesting avenue towards a deeper understanding of both deviant and cooperative behaviors.

We consider that when it comes to studying occupational fraud, at least three grids of analysis are necessary (**Figure 1**): (i) the organization and its rules; (ii) the actor himself; and (iii) the group in which the actor evolves (department, team, branch, etc.).

Understanding the occurrence of fraud in organizations when it is perpetrated by an insider demands more than a clear knowledge of the rules, the policies and procedures in place, the gains and losses at stake, and the internal control weaknesses that fraudsters take advantage of. Indeed, individuals engaging in fraudulent activities have a "system of preferences" and beliefs that will help them interpret and assimilate policies and procedures, perceive risks/opportunities, and gauge whether an action is "fair" or not. Even in an environment where complete information is not available (as controls and detection mechanisms are not explicitly disclosed to all), the perpetrator will choose a course of action and will compensate for the lack of information by using rules of thumb or heuristics and his own selection criteria, drawing from the information gathered from colleagues or from messages received from the organization (39).

The fraudster does not act in a void social climate. He works within a specific group where individuals communicate, there are social interactions, a common history, a culture, shared values, and social norms, but also pressure from peers or coworkers. This cluster of variables can greatly influence the choices of individuals, and it is of paramount importance to scrutinize these when studying deviance at work, and more specifically the occurrence of asset misappropriation (40).

## Theoretical framework and research hypothesis

Research on CPR has expanded rapidly over the past 20 years with significant contributions towards the understanding of how institutions emerge, the impact of internal versus external rules, and which factors may promote sustained cooperation and preserve the common resources (41). This body of knowledge has essentially focused its attention on understanding the use of natural resources such as forests, fisheries, water reserves, etc. as opposed to the analysis of organizations or companies. However, in most recent publications, these frameworks have also been used to study manmade resources such as public data (42). Amongst the questions explored by academics, one can note the analysis of formal versus informal institutional processes, the relationship of resource users, some demographic characteristics (wealth, age, gender), and institutional processes themselves (43). Ostrom and Cardenas, in particular, conducted a series of experiments where participants played a series of games featuring a CPR dilemma. In these games, conducted both in laboratories with students (44) and also with actual CPR users in the field (45), participants were asked to make decisions in different scenarios where the level of communication allowed varied from one group to another. The results of the empirical research demonstrated a higher level of cooperation between individuals with conflicting interests in situations where face-to-face communication was allowed versus the groups where decisions were made without any verbal exchange amongst subjects.

> *Hypothesis 1 (H1): Face-to-face communication enhances cooperation between individuals, resulting in lower levels of asset misappropriation.*

Our first hypothesis is that when individuals have an opportunity to commit fraud, the levels of deviance are higher in situations where communication is not allowed with other colleagues. When individuals can communicate, even if contracts are not enforced, the level of asset misappropriation decreases, and the overall common resource is preserved. We will test this hypothesis by comparing the levels of misappropriation (measured in days of sales not declared in the experiment) in groups of participants where there is communication versus the groups where there is no exchange between the participants.

Even if individuals only engage in "cheap talk" before making their individual private decisions, they seize the opportunity to align their strategies and refrain from committing fraud if the overall community will benefit from ethical behaviors. In the absence of interaction and communication, these self-designed rules within the group cannot emerge.

> *Hypothesis 2 (H2): Whistleblowing programs are perceived as more efficient than other control mechanisms, in particular internal audits, and result in lower levels of occupational fraud.*

The second hypothesis is that there is a difference in the perception of efficiency amongst the internal control mechanisms that can be implemented in a company. While management in general may perceive inspections and audits as a more robust anti-fraud control, the perception of individuals within a group is that a whistleblowing program is more likely to uncover fraud, and as such, there is an incentive to refrain from misappropriating. Time and again, surveys and studies on the phenomenon of occupational fraud have demonstrated that "tips" and

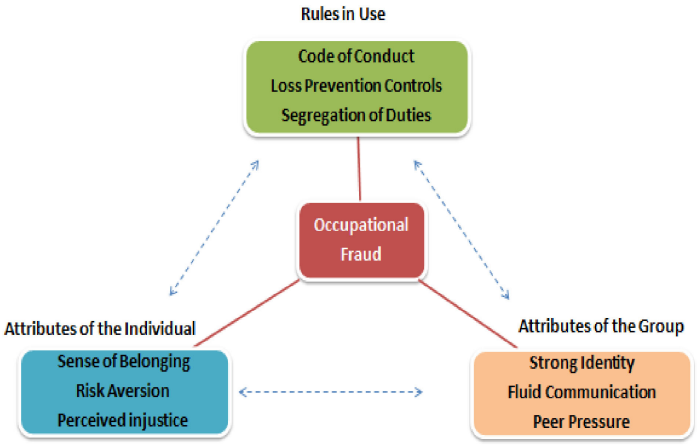


**FIGURE 1 |** A representation of a fraud scenario leveraging Ostrom's framework.

information facilitated by employees are the number one method for uncovering fraudulent schemes (26). As such, the perception is that colleagues or co-workers may be more adept at detecting and reporting deviant behaviors. As a result, control mechanisms involving other members of the organization are likely to be viewed as being more efficient by employees.

Through a series of games encompassing various iterations, we have studied the levels of asset misappropriation (measured in numbers of days of sales skimmed) in groups where the control mechanism is framed as a whistleblowing program and in groups where management has implemented an inspection process with an internal auditor conducting reviews and detecting fraud.

## Reseach methodology

Drawing on the IAD proposed by Ostrom, Cardenas (45) conducted a series of field experiments with actual resource users from a forest in Colombia (46). The experiments placed the users of a natural resource in a situation where they had to choose how many months of exploitation they would engage in, knowing that excess exploitation would eventually negatively impact the common resource. Cardenas observed the behavior of ten groups of eight villagers each in groups with communication and without communication possible. This approach has been adapted to a sales skimming scenario occurring in a private organization, on the basis of the usual conventions set out in most CPR experimental settings (39). In our decision-making experimental design, subjects were asked to participate in a framed field experiment by using an online platform where they entered their decisions privately on the system.

### Main features and nature of the dilemma

We conducted a total of 18 game sessions with groups of four participants each. The games were conducted in neutral meeting rooms, following the same seating plans and setup, where participants were provided with a laptop. **Figure 2** presents the seating plan adopted for the experiments.

Participants were asked to play several iterations of an online "sales skimming game" where the decision related to the level of sales declared to the Central Authority or on the contrary, the level of sales misappropriated for their own benefit (asset misappropriation in the form of sales skimming). In the asset misappropriation scenario proposed to the players, a substantial bonus calculated on the basis of the total collective level of sales was at stake. As such, participants were faced with a classic CPR dilemma, being both inclined to follow their selfish interest (misappropriate sales) but also incentivized to declare all their sales and obtain the collective bonus. In our experiments, several groups of retail employees and sales professionals who actually face similar dilemmas in their day-to-day occupations were observed.

In the game designed for this study, individuals face a dilemma when deciding on their extraction and provision levels from a CPR. While previous experiments focus their attention on the management of a shared natural resource (47, 48), we place our participants in a scenario where a group of sales representatives needs to decide the level of sales reported to a central authority on a monthly basis. In the game, we suppose that due to external factors, it is possible for each sales representative to skim up to 4 days' worth of sales per month (and keep the corresponding sales proceeds for personal gain) without being systematically detected by the Central Authority (the Accounting Department). However, players are also informed that a substantial collective bonus, representing 50% of their net monthly salary, is at stake: the higher the sales reported by each player, the higher the chances for each participant to obtain the bonus. As such, the payoffs of each subject depend not only on individual decisions but also on the level of cooperation of the other players as the bonus is calculated on the basis of the total sales declared by the whole team.

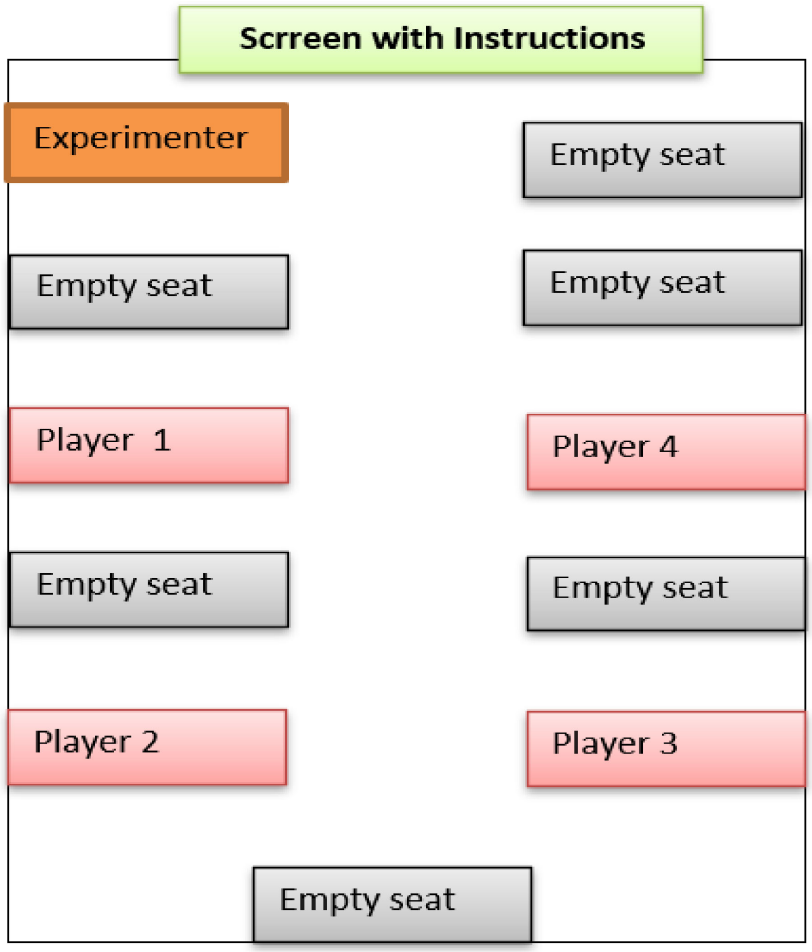


**FIGURE 2 |** Seating plan adopted for the games.

It is important to highlight the fact that all participants logged on anonymously on the game platform, and each of them recorded their decision at the end of each iteration privately, without knowing the individual decisions of the other participants. However, and in order to enable the players to evaluate the impact of their actions and the actions of others, at the end of each iteration the system calculated the overall number of days not declared to the Central Authority by the entire group and whether the collective bonus was obtained or not.

In addition, to evaluate participants' perception of the control mechanisms, participants were told that the Accounting Department implanted a verification method aimed at detecting under-reported sales. The verifications are carried out on a random basis by the system (none of the participants know their frequency or scope), and a penalty is imposed on the players subject to scrutiny when it is detected that they have not declared 100% of their sales. The penalties were calculated by the system, and participants were fined in private, the system informing them of the fact that they were subject to a control and that their misconduct had been detected.

## Rules and payoffs

The instructions of this "sales skimming game" were explained to all 18 groups (4 participants each) in the same way, and these were also available on the online platform, accessible to each player.

Information given to the participants related to gains or losses can be summarized as follows. Each sales representative receives a fixed monthly salary of 1,000 euros, regardless of the level of sales not declared to the central authority. It is assumed that the sales collected in one day amount to 150 euros per person. While the monthly salary is fixed, a collective bonus is also at stake, and it amounts to 500 euros per person if the collective sales target is reached; otherwise, it is zero for each participant.

In the game, on each iteration, each participant has five options: (1) to report all the sales collected; (2) to divert 1 day of sales and misappropriate 150 euros; (3) to divert 2 days of sales and misappropriate 300 euros; (4) to divert 3 days of sales and misappropriate 450 euros, or (5) to divert 4 days of sales and misappropriate 600 euros.

The Central Authority has put in place a control mechanism to review the sales figures declared by the players.

When anomalies are found, a penalty of 250 per day not reported is deducted from the earnings of the person being controlled.

In summary, players are told that their monthly earnings amount to their fixed salary plus the amount of the bonus (either zero or 500) plus the amount of sales not reported minus the penalty if they are caught while misbehaving. Their earnings are calculated with the following formula:

$$M\varepsilon = 1,000 + 500\beta\rho + 150x - 250x\alpha$$

Where:

$M\varepsilon$ = Monthly earning.
$\beta \in \{0,500\}$ this represents the monthly bonus.
$x \in \{0,1,2,3,4\}$ this represents the number of days of sales misappropriated.
$\rho = [0,1]$ this is the perceived probably of obtaining the bonus.
$\alpha = [0,1]$ this is the perceived probably of getting caught by the control mechanism.

To facilitate the decision-making process and the calculations, on their terminal, each individual had access to the payoff matrices, one presenting payoffs without penalties and one with the penalties (**Table 1**).

The matrices present on each column the number of days of sales misappropriated by the player and in lines the aggregated number of days not declared by the other three players, thus showing the payoffs of all possible combinations.

## Participants and experimental conditions

In our experimental design, we recruited employees working in sales departments, either in retail or in other industry types, in Paris (France) and the greater Paris area over the months of July and August 2024. We aimed at conducting our experiments with individuals familiar with the type of dilemma presented in our scenario, given the fact that collective incentive packages are common in the sales industry (49, 50). We framed the payoff formula with round numbers to facilitate the calculations.

For conducting these experiments, no personal data in the sense of the General Data Protection Regulation was collected, as no identifiable information that could identify the individuals was collected or captured during the experiments. All individuals involved chose to voluntarily participate in the study, which obtained ethical approval and which has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans.

Initially, 20 groups of 4 participants were recruited, totaling 80 individuals. However, due to logistical difficulties, for 2 groups the games could not be completed in adherence to the protocols, and therefore 2 groups were excluded. As a result, this present study reports the results of 72 individuals participating in our experiments, divided into 18 separate groups of four adults. We ran various pilot sessions prior to collecting the data for the present study. These pilot games led us to conclude that groups of 4 participants were large enough to promote communication and allow all individuals to participate meaningfully and at the same time small enough to enable the implementation of the experimental protocols. From a statistical standpoint, the sample size of 72 individuals satisfies the requirements for employing parametric statistical analyses, such as the Student's t-tests, which were used to test our hypotheses concerning behavioral intention to commit fraud and group dynamics under our experimental conditions. The Central Limit Theorem justifies that for sample sizes $n \geq 30$, the sampling distribution of the mean approximates normality, thereby supporting the use of t-tests (51). In order to avoid gender biases or heterogeneous groups that could distort the results (52), we created groups of individuals of the same sex and of similar ages. When this was not possible, we created mixed groups with an equal number of male and female participants. The players were recruited through ads posted on various Internet sites, and the participants did not know each other. All the game sessions were conducted in French, the seating plans were all identical, and only two meeting rooms were used to host the games in order to conduct the experiments in the same conditions. The rules of the sales skimming game were explained by the same experimenter and were also available to all participants on the online platform. Before the start of each session, a "trial" game was played to ensure that all participants understood the rules and the payoff matrices, and the experimenter projected the matrices on a wall or a paperboard to illustrate a few examples.

Each group of participants played three sets of games but without knowing how many games would be played or how many rounds were included in such games. The games were the following:

> **INC:** Game where the control mechanism was an internal auditor, but no communication was allowed amongst the players.
> **IC:** Game where the control mechanism was an internal auditor and with communication allowed amongst all participants.
> **WC:** Game where the control mechanism was whistleblowing program and with communication allowed.

Each game involved 8–10 iterations, and when communication was allowed, the experimenter timed the discussions to 5 minutes in between rounds. No threats or side payments were allowed during the communication phase. In total, over 400 rounds of games were observed, 18 sessions of 4 participants each were conducted, and 72

**TABLE 1** | Payoff matrices.

| Days not declared by me | | | | | | Days not declared by me | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | **1** | **2** | **3** | **4** | **Days not declared by others** | **0** | **1** | **2** | **3** | **4** |
| 1500 | 1650 | 1800 | 1950 | 2100 | **0** | 1500 | 1400 | 1300 | 1200 | 1100 |
| 1500 | 1650 | 1800 | 1950 | 2100 | **1** | 1500 | 1400 | 1300 | 1200 | 1100 |
| 1500 | 1650 | 1800 | 1950 | 2100 | **2** | 1500 | 1400 | 1300 | 1200 | 1100 |
| 1500 | 1650 | 1800 | 1950 | 2100 | **3** | 1500 | 1400 | 1300 | 1200 | 1100 |
| 1500 | 1650 | 1800 | 1950 | 2100 | **4** | 1500 | 1400 | 1300 | 1200 | 1100 |
| 1000 | 1150 | 1300 | 1450 | 1600 | **5** | 1000 | 900 | 800 | 700 | 600 |
| 1000 | 1150 | 1300 | 1450 | 1600 | **6** | 1000 | 900 | 800 | 700 | 600 |
| 1000 | 1150 | 1300 | 1450 | 1600 | **7** | 1000 | 900 | 800 | 700 | 600 |
| 1000 | 1150 | 1300 | 1450 | 1600 | **8** | 1000 | 900 | 800 | 700 | 600 |
| 1000 | 1150 | 1300 | 1450 | 1600 | **9** | 1000 | 900 | 800 | 700 | 600 |
| 1000 | 1150 | 1300 | 1450 | 1600 | **10** | 1000 | 900 | 800 | 700 | 600 |
| 1000 | 1150 | 1300 | 1450 | 1600 | **11** | 1000 | 900 | 800 | 700 | 600 |
| 1000 | 1150 | 1300 | 1450 | 1600 | **12** | 1000 | 900 | 800 | 700 | 600 |

**TABLE 2** | Overview of the data collected.

| | |
|---|---|
| Number of sessions | 18 |
| Total number of subjects | 72 (44 female, 28 male) |
| Number of players per game | 4 |
| Number of games played per session | Between 1 and 3 |
| Treatments: | |
| 1) INC | *Inspection but no communication* |
| 2) IC | *Inspection with Face to Face communication* |
| 3) WC | *Whistleblowing program with Face to Face communication* |
| Rounds played for each treatment | 8 or 10 |
| Total number of rounds observed | 404 |

**TABLE 3** | Descriptive statistics – variable X representing the number of days of sales skimmed.

| | Variable X[a] | | | |
|---|---|---|---|---|
| **Treatment[b]** | **Max** | **Min** | **Average** | **Standard deviation** |
| INC | 22 | 0 | 12 | 3.56 |
| | $N = 72$ | $N = 72$ | $N = 72$ | $N = 72$ |
| IC | 20 | 0 | 8 | 2.23 |
| | $N = 52$ | $N = 52$ | $N = 52$ | $N = 52$ |
| WC | 15 | 0 | 6 | 1.89 |
| | $N = 52$ | $N = 52$ | $N = 52$ | $N = 52$ |

[a]We present here varialbe X, measuring the intention to comit fraud, expressed in number of days of sales not reported in the different treatments.
[b]Treatment IC encompassed 8 rounds while IC and WC encompassed 10 rounds. We present the results for all treatments for the first 8 rounds.

participants were observed. Table 2 summarizes the data collected.

These games were designed to observe participants in a controlled environment where only the level of communication amongst the participants and the control mechanisms were changed, with all the other parameters remaining identical. Through the scores recorded by each participant (number of days of sales skimmed), we aimed at measuring the impact of communication on the behavior of the players and, as such confirming our initial research hypothesis.

## Experimental findings

We present the results of the experiment first in relation to the impact of communication amongst the group of players, then in relation to the internal control mechanism implemented (internal auditor or whistleblowing program). We represent the dependent variable X, representing the intention to commit fraud. Table 3 summarizes the results observed during the game and the decisions logged in the game platform by the players.

### *Face to face communication led to reduced levels of occupational fraud*

Across the groups that participated, we noted that the results concur with most experimental evidence when face communication is introduced.

The level of cooperation in the groups increased when face-to-face communication was introduced, thus leading to lower levels of misappropriated sales, which in turn resulted in a positive outcome as the collective bonus target figures were reached. Figure 3 illustrates the evolution of the variable $x$ (number of days of sales misappropriated) per round across the groups studied for the treatment with communication (IC) and without communication (INC).

A set of Student's t-tests were conducted, and it was noted that face to face communication induced a statistically

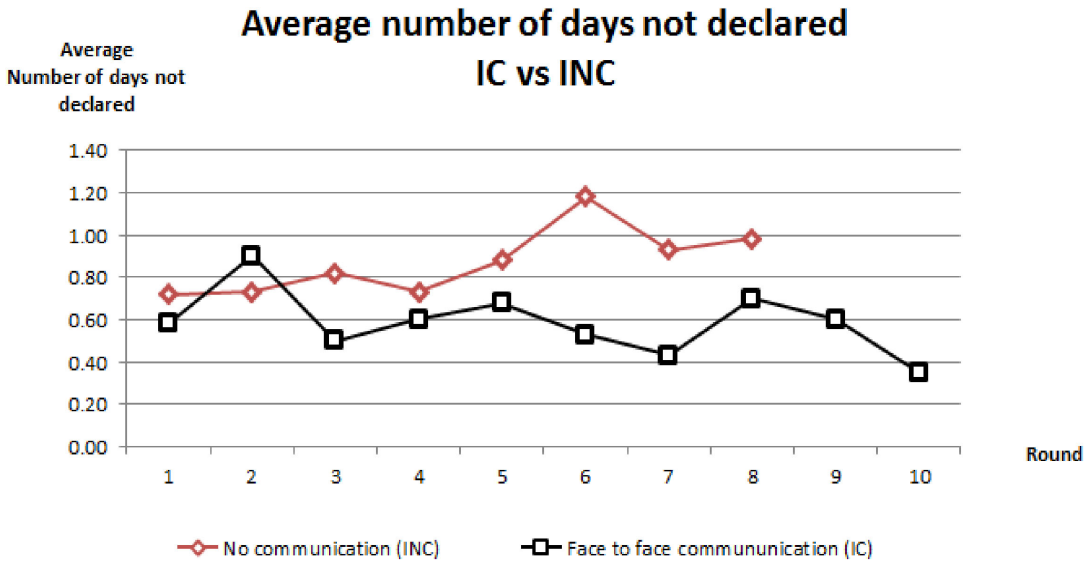


**FIGURE 3 |** Average individual number of days not declared over rounds.

significant change in participants behavior where the average number of days not reported went from an average of 0.87 during the non-communication game to 0.58 when communication was introduced ($p$-value = 0.001). In other words, face to face communication led to a lower incidence of occupational fraud.

## Whistleblowing as an internal control mechanism is perceived as being more effective

Participants engaged less frequently in asset misappropriation (declared more days of sales) in the phases where the control mechanism was the Whistleblowing Program (treatment WC) as opposed to the phase where they were told that an Auditor was examining their sales declarations (treatment IC). In reality, the actual likelihood of detection was identical during the two phases, but the players' perception was different. Although the participants played 8–10 iterations in each game, in order to exclude the "end of game effect" (53) we compared the results of the first six rounds of each game. We found a statistically significant difference in the behavior of the participants for all the groups tested ($p$-value = 0.036), and a clear intention to cooperate more (declare more days of sales) when the Whistleblowing program was the control mechanism in place (refer to **Tables 4** and **5**).

These experimental results confirm our initial hypotheses H1 and H2. On the one hand, we could demonstrate that when face-to-face communication was introduced in the games, oral agreements were made and enforced, leading to lower levels of sales skimming and higher bonuses. On the other hand, the behavior of the players also changed when they were told that a whistleblowing program was in place.

**TABLE 4 |** Average number of days not reported per round and per control mechanism.

| Round | Internal auditor with communication (IC) | Internal auditor no communication (INC) | Whistleblowing program with communication (WC) |
|---|---|---|---|
| 1 | 27 | 48 | 27 |
| 2 | 47 | 58 | 25 |
| 3 | 31 | 58 | 23 |
| 4 | 29 | 58 | 30 |
| 5 | 37 | 59 | 28 |
| 6 | 29 | 90 | 18 |
| 7 | 25 | 75 | 44 |
| 8 | 38 | 71 | 21 |
| **TOTAL** | **263** | **517** | **216** |

**TABLE 5 |** Average number of days not reported per round whistleblowing vs. internal auditor.

| Round | Whistleblowing Program | Internal Auditor |
|---|---|---|
| 1 | 0.50 | 0.58 |
| 2 | 0.45 | 0.90 |
| 3 | 0.48 | 0.50 |
| 4 | 0.53 | 0.60 |
| 5 | 0.53 | 0.68 |
| 6 | 0.30 | 0.53 |
| Number of Players | 40 | 40 |
| Number of observations | 240 | 240 |

The perception was that the likelihood of being caught was higher when this control mechanism was in place, which in turn led to lower levels of sales being skimmed in the groups

who played with these rules in comparison to the group being told that an internal auditor was controlling the sales figures.

## Discussion and managerial implications

Through the series of experiments conducted, we found that fostering communication in an organization can lead to a reduction of occupational fraud. This reinforces the idea that solid fraud prevention mechanisms must incorporate campaigns aimed at disseminating the company's values, awareness, and ethical standards. The determination in punishing deviant behaviors must be clear at all levels of the organization. Beyond the perceived fraud opportunities, the decision to perpetrate fraud involves a member of a social group who may actually refrain from misbehaving if he feels that he is part of a fair and ethical group and if he identifies himself with this organization.

Furthermore, a strong perception that fraud cannot go undetected or unpunished results in lower levels of misbehavior, irrespective of the actual efficiency of the control mechanisms, and results in lower levels of asset misappropriation. This concurs with our second hypothesis, as whistleblowing programs were perceived as more efficient, and less skimmed sales were noted, even if, in fact, in the games played by our participants, the likelihoods of detection and punishment were the same in all the games played by the subjects.

From a practitioner's perspective, the results of this analysis convey the idea that classic control mechanisms (internal audits, segregation of duties, and policies and procedures) must be reinforced by fluid communication throughout organizations, and whistleblowing and hotline programs should be leveraged more actively in the fight against fraud, as they are perceived as being more efficient than the classic internal audit control.

## Conclusion

The paper aimed at examining two main interrelated topics. On the one hand, the role of communication and interaction in the occurrence of fraud, and on the other hand, to highlight the comparative impact of internal controls aimed at preventing fraud. In our analysis we chose to limit our research to fraud misappropriation scenarios, which are more common than financial statement fraud or bribery and corruption. We specifically studied sales skimming situations, and we gathered our data from a group of participants actually confronted to these dilemmas in their day-to-day as sales employees evolving in different industries.

We found that, in line with theory predictions, introducing communication amongst a group of individuals where there are opportunities for occupational fraud reduces the occurrence of deviance. We further showed that the perception of employees is that a control emerging from the staff population itself (a whistleblowing program) is actually perceived as being more effective than a control implemented and monitored centrally, such as an internal auditor. It is therefore essential to promote a blend of internal control mechanisms in a company to achieve better resilience against occupational fraud. These findings have implications both for practitioners and for academics. More time and energy should be invested in promoting cohesion and ethical behavior through organizational communication, as these are often viewed as secondary.

## Limitations and suggestions for further research

These findings have implications both for practitioners and for academics, and it opens up further opportunities for research in the area of occupational fraud. Indeed, due to our limited resources, in our study we concentrated on a particular category of occupational fraud (asset misappropriation) with a group of 72 participants. It would be pertinent to expand this research to larger groups and also explore other types of frauds, such as financial statement misrepresentation, bribery, corruption or money laundering, to name a few.

Furthermore, we recognize that this analysis was conducted with participants only employed or having previously been employed in sales. Exploring other professional backgrounds and contrasting the current results to other industries and occupations could also provide novel pathways for further investigation.

Finally, future research could also explore even further the efficiencies of control mechanisms in various cultural contexts and where participants interact with artificial intelligence (AI) agents in work environments that will tend to become hybrid. Exploring how communication, teamwork, cohesion, and ethical standards can be promoted in a work environment where humans will have to work alongside AI agents across many fields will further inform academics and practitioners on new ways to mitigate the threat of occupational fraud.

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