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FACULTAD DE CIENCIAS ECONÓMICAS Y ADMINISTRATIVAS

IMPACT OF EMPLOYEE BURNOUT ON PRODUCTIVITY: A FIELD EXPERIMENT

Trabajo de Titulación presentado en conformidad con los requisitos establecidos para
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DECLARACIÓN DEL PROFESOR GUÍA

"Declaro haber dirigido el trabajo, Impact of employee burnout on productivity: A field experiment, a través de reuniones periódicas con la estudiante Melissa Nicole Miranda Romero, en el semestre 2023-20, orientando sus conocimientos y competencias para un eficiente desarrollo del tema escogido y dando cumplimiento a todas las disposiciones vigentes que regulan los Trabajos de Titulación".



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" Declaro haber revisado este trabajo, Impact of employee burnout on productivity: A field experiment, de Melissa Nicole Miranda Romero, en el semestre 2023-20, dando cumplimiento a todas las disposiciones vigentes que regulan los Trabajos de Titulación".

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A handwritten signature in blue ink, reading "Melissa Miranda R.", is positioned above a horizontal line.

Melissa Nicole Miranda Romero

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A Dios, mi compañero incondicional. A Elizabeth, mi mamá, por impulsarme a dar lo mejor. A todos los profesores que me han inspirado su pasión por la economía, en especial a Roberto Mosquera por la guía y el aliento constantes.

DEDICATORIA

Para mi mamá, por impulsarme a volar y ser mi fortaleza. Para mi papá y mis ángeles que me acompañan con amor.

RESUMEN

El burnout o agotamiento crónico es una de las amenazas ocupacionales más importantes especialmente desde la pandemia de COVID-19. El burnout impone costos para el individuo, las empresas y la sociedad en términos de pérdidas de productividad y bienestar. Sin embargo, hay poca evidencia de sus efectos causales en la productividad. En este estudio, aproveché un experimento de campo natural en el centro de llamadas de una empresa de cobranza en Ecuador para evaluar los efectos del burnout en la productividad de los trabajadores. A través de un diseño de estímulo aleatorio, estimo si la participación en una intervención de tres semanas, que consiste en dar a los trabajadores una plataforma para compartir experiencias profesionales positivas mientras leen las historias de sus compañeros, podría reducir el burnout, y el efecto de la reducción en burnout en medidas de productividad de los trabajadores. Los resultados indican que animar a los empleados a participar en la intervención podría reducir el burnout en 0.86 puntos. A pesar de que el cambio en el agotamiento es demasiado pequeño para poder evaluar su efecto en la productividad, las estimaciones por bandas muestran que la reducción de 1 punto en el burnout puede aumentar la productividad de los trabajadores entre 6 y 14 puntos porcentuales. Más allá de la magnitud, el signo del efecto valida un impacto negativo del burnout en la productividad de los trabajadores. Estos hallazgos sugieren que las intervenciones de bajo costo destinadas a aumentar el apoyo social percibido entre los empleados pueden reducir el burnout y tener un impacto positivo en los resultados de productividad de los trabajadores.

ABSTRACT

Burnout is one of the most important occupational threats since the COVID-19 pandemic. Burnout imposes costs for the individual, firms and society in terms of lost productivity and well-being. However, there is little evidence of its causal effects on productivity. In this study, I exploit a natural field experiment in the call center of a collection company in Ecuador to assess the effects of burnout on worker productivity. Through a random encouragement design, I estimate whether participation in a three-week intervention, which consists of giving workers a platform to share positive professional experiences while reading their colleagues' stories, could reduce burnout, and the effect of the reduction in burnout in measures of worker productivity. The results indicate that encouraging employees to participate in the intervention could reduce burnout by 0.86 points. Although the change in burnout is too small to assess its effect on productivity, band estimates show that a 1-point reduction in burnout can increase worker productivity by 6 to 14 percentage points. Beyond the magnitude, the sign of the effect validates a negative impact of burnout on worker productivity. This findingd demonstrated that low-cost interventions intended to increase perceived social support among employees can reduce burnout and have a positive impact on worker productivity outcomes.

INDEX

<i>I. Introduction.....</i>	<i>6</i>
<i>II. Experimental Design.....</i>	<i>9</i>
A. Implementation	12
<i>III. Data.....</i>	<i>13</i>
<i>IV. Empirical Strategy</i>	<i>20</i>
<i>V. Results.....</i>	<i>22</i>
A. Effect of three-week intervention to share professional experiences on burnout	22
B. Effect of burnout on worker productivity outcomes	26
i. Nonparametric bounds of the average treatment effect of burnout on workers' productivity outcomes.....	27
<i>VI. Conclusions</i>	<i>30</i>

I. Introduction

Chronic workplace stress and exhaustion have become among the most critical occupational threats today, because of their costs for individuals and organizations. The World Health Organization (WHO) included burnout as an occupational phenomenon in the 11th Revision of the International Classification of Diseases (ICD-11) in 2019. Burnout results from chronic workplace stress and is characterized by three dimensions: emotional exhaustion, cynicism, and professional inefficacy (Maslach & Jackson, 1981; World Health Organization (WHO), 2019). Since the COVID-19 outbreak, occupational health concerns have been growing due to the increased stressors the pandemic brought. Even though some occupations, especially human services employees and first responders, are more vulnerable, almost every worker faces new challenges from longer work hours, remote work, or increased home demands. According to the American Psychological Association, the prevalence of workers who reported job stress increased by 38% during the pandemic (American Psychological Association (APA), 2021).

In this paper, I study how burnout affects productivity. To answer this, I use a random encouragement design to create exogenous variation in burnout by randomizing an intervention to increase employee-perceived social support, following the experimental design by Linos et al. (2022). In this approach, encouragement is used as an instrumental variable which allows me to analyze the effects of the intervention on burnout and the effects of burnout on workers' productivity outcomes.

Despite the increase in studies related to the topic, most empirical evidence relies on correlation analysis and qualitative research. Social support is commonly emphasized as a vital resource in the workplace due to the empirical literature, which frequently suggests that individuals who report strong social support also tend to report lower levels of burnout. These findings are primarily correlational, and it is unclear what direction this relationship is taking (Baruch-Feldman et al., 2002;

Holmes et al., 2021; Kim & Stoner, 2008; KOSSEK et al., 2011; Lizano & Mor Barak, 2012).

Experimental works have gained ground in the last few years, similar to Linos et al. (2022). Linos et al.'s (2022) run a field experiment among 911 call center agents from nine mid-sized cities in the United States. The experiment was centered on an intervention that intended to enhance the perception of social support and increase the sense of belonging of dispatchers by nudging participants to engage in sharing their experiences and accessing their peers' professional advice through an asynchronous and anonymous online platform. The authors found that the intervention increased perceived social support by 0.27 standard deviations and reduced burnout by more than 8 points or 0.4 standard deviations.

However, the results still focused on soft measures of work performance, like absenteeism, rather than worker productivity. This study contributes to the literature by bringing a solid design to identify the causal effect of burnout on productivity. Burnout is a subject little explored in the economic literature but with significant impacts on productivity, and this work aims to bring the analysis of burnout to its economic effects directly related to the firms.

Burnout results in adverse consequences that are not only limited to the individual but also affect production functions across industries and society. Regarding health consequences, burnout is associated with gastric disorders, headaches, cardiovascular alterations, type 2 diabetes, musculoskeletal pain, and other pain-related disabilities, as well as chronic fatigue and burnout people also report more frequent sleep problems, depression, and anxiety symptoms (Bakker et al., 2005; Edú-Valsania et al., 2022; Linos et al., 2022; Lubbadah, 2020; Maslach et al., 1997; Maslach & Jackson, 1981). For its psychological consequences, burnout is associated with insomnia, reduced coping capacity, low self-esteem, increased irritability, anxiety, and depression. Adverse effects occur at both cognitive and emotional levels, and some of these conditions could precede more severe health

implications (Leiter et al., 2013; Edu-Valsania et al., 2022; Lubbadah, 2020). According to Goh et al. (2016), the cost of treatment for work-related stress health problems ranges between \$125 to \$190 billion for the US healthcare system each year.

At an organizational level, burnout is associated with higher absenteeism, lower compliance, low organizational commitment, counterproductive behaviors, and higher levels of turnover (Edu-Valsania et al., 2022). Borritz (2006) find that an increase of one standard deviation on the work-related burnout scale predicts an increase of 9% in sickness absence days per year. At the same time, Amer et al. (2022) report that absenteeism rates among academic staff with a higher burnout score are 2.1 to 3.3 times those among those with lower burnout.

Regarding turnover, Califf and Brooks (2020) relate burnout impacts turnover intention by 0.36 p.p in US K-12 teachers, with estimated costs reaching \$20,000 for each teacher who leaves an urban district (Carver-Thomas & Darling-Hammond, 2019). High turnover also presents significant costs for government and public agencies. The direct costs of resignation are estimated from 90 to 200 percent of a worker's annual salary. Moreover, turnover may end in periods of understaffing and break employees' learning period, leading to lower quality of service and results (Linos et al., 2022).

Job burnout can also impact relationships at work. According to Maslach and Leiter (2016), burnout people can disrupt the workflow and propagate stressors through social interactions. A study among nurses found that perceived burnout complaints among peers harmed individual burnout (Bakker et al., 2005). The adverse effect of burnout on co-workers can predict personal strife and lower levels of job satisfaction (Lubbadah, 2020).

The paper is organized as follows. Section 2 discusses the experimental design and the results of its implementation. Section 3 describes the data used for this

study. Section 4 continues with a description of the empirical strategy that allows to identify the causal effects of interest. Section 5 reports results for two groups of outcomes: burnout and productivity. Finally, section 6 concludes.

II. Experimental Design

This study exploited a company project focused on reducing the burnout of debt-collection call center agents. The company is a debt collection agency specializing in recovering past-due loans from banks and other commercial and financial credit issuers in the country. Its head office is in Quito, Ecuador, and it has one branch in Guayaquil. The target population of this project is the 230 collection agents of the call center of this company. Like many call center workers, employees of this firm work an average of 6 hours per day. They typically deal with payment-reluctant customers. Their negotiation skills, listening skills, and the quality of service they give through phone calls are crucial to reaching payment agreements with debtors. According to the burnout literature, jobs that demand a considerable amount of people interaction, like this one, are believed to be the most vulnerable to burnout.

Specifically, I exploit an initiative of the company's Human Resources area to reduce burnout. Under the perception that call center workers are highly exposed to stress, the company's Human Resources (HR) area decided to measure workers' burnout levels. Then it implemented a three-week intervention to reduce burnout. This project consisted of three major phases from June to August 2023 (Figure 1):

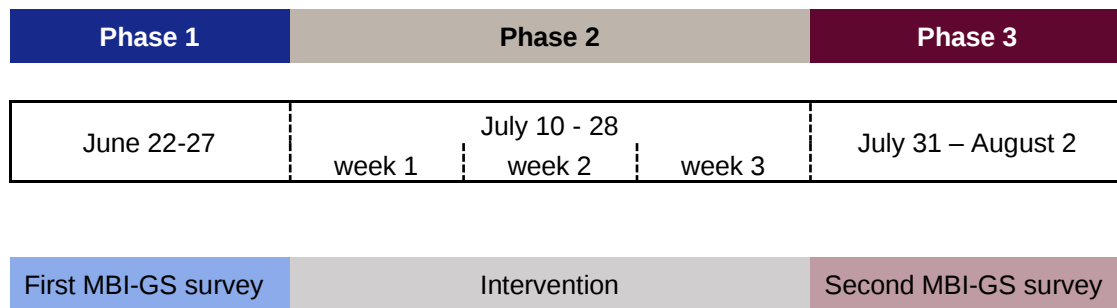


Figure N° 1: Experimental timeline

The project started with a baseline measurement of burnout using the Spanish version of the Maslach Burnout Inventory - General Survey (MBI – GS). The MBI–GS test is commonly used to measure burnout across all occupations. The questionnaire is made up of 16 questions addressed that seek to identify the three components that define burnout: emotional exhaustion (5 questions), detachment from the job or cynicism (5 questions), and professional efficacy (6 questions). Each question is phrased in the form of statements about feelings. The employee is expected to answer according to the frequency with which they experienced those feelings, using a 6-point Likert scale ranging from 0-never to 6-every day (CENTRO NACIONAL DE CONDICIONES DE TRABAJO, 2004; Maslach et al., 1997; Rodríguez Ramírez et al., 2017; Vinueza-Veloz et al., 2020). The MBI–GS consistency to measure burnout has been widely validated for different occupations and countries (Schutte et al., 2000).

The company's HR team entirely implemented Phase 1 without my assistance. The call center agents received a message from a member of the HR team encouraging them to answer the MBI-GS questionnaire. All the call center agents answered the same survey on an online form¹. The HR team can identify the call center agents to generate health interventions. I have access to anonymized results for this study.

¹ The message text and online survey questions are in Appendixes 1 and 2.

Phase 2 consisted of an intervention in which employees were given access to an online platform to share positive professional experiences and advice and read their peer's comments. This intervention follows the design of Linos et al. (2022), who implemented a similar intervention on 911 dispatchers in the United States.

The experimental contribution to this company intervention is designing a way to test whether sharing experiences with peers can reduce burnout and its effects on productivity. A direct approach would be to take all the call center agents and randomly invite some and not others to participate in the online board to share professional experiences. However, this approach has two problems. First, it is unethical to restrict access to a platform that may reduce burnout. The second issue is the potential for spillover effects. All call center agents share space and activities throughout the day and have social interactions that I cannot control. To address these issues, I implemented a random encouragement design, which consists of randomly varying the intensity of messages to remind and encourage platform use. People may be randomly encouraged to receive a particular treatment as an alternative to the traditional randomized controlled trial for interventions for which it is not practical, unethical, or unrealistic to assign treatment randomly. Random encouragement is a common approach in the health and social sciences. Instrumental variable (IV) estimating approaches can then calculate the treatment's effect in an encouraging design, even when compliance is not perfect (Ball & Bogatz, 1970; List et al., 2017; Schmiedek & Neubauer, 2020; West et al., 2008).

I took all employees who completed the survey in Phase 1 and randomly assigned half of the sample to the treatment group. The treatment group received more notifications from HR encouraging them to participate in the online board, looking to increase their participation above the control group. The treatment group received an invitation email to participate in the online platform during the first week and daily notifications for the three weeks with messages about new posts, a summary of

publications, and questions participants could answer on the board. The control group received the same invitation message during the first week to inform them of the board but did not receive additional prompts².

For Phase 2, the company's HR team worked with the research team. I participated in the intervention's design and performed the randomization for treatment and control groups, while the HR team designed and sent the messages to motivate employee participation. The HR team created an online platform with a visual board where participants could share text, image, and video content while collaborating asynchronously with their peers. The same team also monitored the platform and collected the times each person interacted on the online board. I did not have contact with any of the participants.

For the last stage, participants must complete the MBI-GS survey immediately following the three-week intervention. The questionnaire is identical to the one in Phase 1, allowing us to see how the burnout measurement changed after the intervention. As in Phase 1, participants received a message from a member of the HR team encouraging them to answer the MBI-GS questionnaire through an online form. The HR team was responsible for executing data collection for this phase and finally sharing an anonymized database with results to me for analysis.

A. Implementation

The company project targeted all its call center agents at the time of the study. Two hundred thirty individuals initiated Phase 1, and all completed the MBI-GS survey. All the employees that completed Phase 1 participated in Phase 2, and half of the

² Examples of messages sent for each group are in the Appendix 3.

sample was randomized into the treatment group (n=116). After the three-week intervention, 29.67% of the employees assigned to the treatment group have at least one interaction (one access) on the online board to share their professional experiences. Those in the control group have a lower participation rate in the platform. Only 5.21% of individuals have any interaction on the platform. In Phase 3, all participants from Phase 2 received an invitation to complete the MBI-GS survey, and 81.30% of employees completed it, thus 187 individuals conformed the final sample. Given my sample size and the average prevalence of burnout, I can detect effects up to 0.4130 percentage points in the workers' productivity measures at the 5% level with a power of 80%. Despite having lost 18.7% of the initial sample, the magnitude of the effect that can be detected on worker productivity measures is considerable.

If I look at the characteristics, demographic, and work characteristics, of the survey respondents, and compare them with those of all participants in Phase 1, I find that survey participants are representative. Also, I find no evidence of a statistically significant difference in the response rate for people assigned to either the treatment or the control group. There is no evidence of attrition correlated with treatment. Table 3 displays the comparison between all trial participants and final MBI-GS burnout survey respondents. All phases were completed in the time detailed in Figure 1.

III. Data

The data used for this analysis come from administrative records of the debt collection agency and from the results of the company project to reduce the burnout of call center agents. All data collection, which entails collecting the results of the two measurements of the MBI-GS questionnaire and collecting results of workers'

participation in the online platform, was done by the firm's HR team. They merged project results with administrative records for each employee using national identification numbers and released an anonymized dataset for this study.

The MBI - General Survey assesses three scores for each respondent, one for each dimension of burnout (Maslach et al., 1997; Maslach & Leiter, 2016). Burnout syndrome is present when there is a high level of emotional exhaustion and cynicism and a low level of professional efficacy. However, three individual scores add complexity to the analysis, so I follow Kalimo et al. (2003) and use a composite burnout score, acknowledging that each subscale has different weights in the occupational phenomenon. The Leiter and Maslach (2016) scoring procedure was also followed as an alternative to validate burnout measures from the previous approach. This procedure separately analyzes the three scores for each burnout dimension and summarizes five people's work experience profiles. Thus, burnout will be measured through two indicators, a continuous burnout score index following Kalimo et al. (2003) and a dummy burnout indicator following Leiter and Maslach (2016).

The firm's administrative records about employees include demographic and work characteristics data. The records contain information on sex, age, education level, company tenure, job title, office where employee reports, the team where employee reports, monthly payment goal, and monthly payment agreement goal over contact clients from June to August 2023. Administrative records also include workers' productivity measures: the amount of payment and the number of payment agreements received by each call center agent. Worker productivity measures are the outcomes of interest for this study.

One of the concerns when measuring worker productivity is to find a metric that captures the differences in the portfolio of clients that each agent maintains. For this reason, I use weighted measures of the monthly debt collection goal assigned to each worker. The monthly goal of each worker is calculated by his supervisor, considering the historical results expected on the portfolio assigned to each one. Thus, the worker productivity used was the compliance with the payment goal per agent and the compliance with the number of payment agreement goals on debtors contacted per agent as:

$$\text{Compliance with payment goal} = \frac{(\$) \text{ Payments per agent}}{(\$) \text{ Payment goal per agent}}$$

Compliance with the number of payment agreement goal on debtors contacted

$$\begin{aligned} &= \frac{\frac{\text{Number of payment agreements}}{\text{Number of clients previously contacted by the agent}}}{\frac{\text{Goal of the number of payment agreements}}{\text{Goal of the number of clients previously contacted by the agent}}} \\ &= \frac{\text{Proportion of payment agreements over debtors contacted per agent}}{\text{Goal of proportion of payment agreements on debtors contacted per agent}} \end{aligned}$$

The weighted index (Kalimo et al., 2003) and is the result of a weighted sum of the means score for each of the three dimensions of burnout:

$$\begin{aligned} \text{Burnout score} &= (0.3 \times \text{emotional exhaustion}) + (0.3 \times \text{cynism}) \\ &\quad + (0.3 \times \text{professional efficacy}) \end{aligned}$$

Each individual's score can range between 0 and 6, with higher scores indicating more severity of burnout. Burnout risk can then be determined by identifying the following three groups: there is no burnout indication for a score below 50th percentile

of the score, for a burnout score from 50th percentile to the 75th percentile, there are considered some burnout symptoms, and above the 75th percentile, there are severe indications of burnout. Table 1 displays the scores for each of the MBI-GS scales for each group, half of the participants (50.27%) presents some or severe indications of burnout.

Table N° 1: Summary Statistics MBI scale by group

	N	%	Exhaustion	Cynicism	Efficacy	Score
No burnout	93	49.73%	0.72	0.42	5.37	1.86
Some burnout	48	25.67%	0.99	0.70	5.79	2.52
Severe burnout	46	24.60%	2.51	1.67	5.44	3.66
Overall	187	100.00%	1.32	0.81	5.42	2.47

I follow the Leiter and Maslach (2016) scoring procedure as a second metric for burnout. In this procedure, the three scores for each burnout dimension are analyzed separately and summarized in five profiles of people's work experience:

Table N° 2: Detail of work profiles

Profile	Detail	Measurement
Burnout	Negative scores on exhaustion, cynicism, and professional efficacy	$Exhaustion\ mean_i > P_{50} = 1$
		$Cynicism\ mean_i > P_{50} = 0.6$
		$Efficacy\ mean_i < P_{50} = 6$
Overextended	Strong negative score on exhaustion only	$Exhaustion\ mean_i > P_{50} = 1$
		$Cynicism\ mean_i < P_{75} = 1.2$
		$Efficacy\ mean_i > P_{25} = 5.67$

Ineffective	Strong negative score on professional efficacy only	$Exhaustion\ mean_i < P_{75} = 2$
		$Cynicism\ mean_i < P_{75} = 1.2$
		$Efficacy\ mean_i < P_{50} = 5.67$
Disengaged	Strong negative score on cynicism only	$Exhaustion\ mean_i < P_{75} =$
		$Cynicism\ mean_i > P_{50} = 0.6$
		$Efficacy\ mean_i < P_{50} = 5.67$
Engagement	Strong positive scores on exhaustion, cynicism, and professional efficacy	$Exhaustion\ mean_i < P_{50} = 1$
		$Cynicism\ mean_i < P_{50} = 0.6$
		$Efficacy\ mean_i < P_{50} = 6$

Adapted from: Leiter and Maslach (2016)

The burnout and overextended profiles correspond to people with burnout symptoms, so both are considered burnout (Leiter & Maslach, 2016). I created a dummy indicating if a call center agent has either of these profiles to identify burnout. Using this metric, the prevalence of burnout is slightly below half of the sample (46.52%). Appendix 4 Table 7 exhibits the scores of each profile for every MBI dimension.

Finally, the data includes a metric for participation in the online platform. It reports the number of times an employee accesses the online board. Each participant had to register on a welcome page before accessing the platform.

Table N° 3: Sample summary Statistics

	Full Sample	Control	Treat	p-value
Panel A: All trial participants (Phase 1)				
Prop. Women	0.6912	0.7423	0.6449	0.1322
Age (years)	36.4853	35.5567	37.3271	0.1222
Prop. Secondary Education	0.6225	0.6082	0.6355	0.6902
Prop. College Education	0.3039	0.3299	0.2804	0.4460
Company Tenure (years)	9.3468	8.9364	9.7188	0.4765
Job Title: Prop. Collection Agent	0.9069	0.9175	0.8972	0.6182
Prop. Onsite Job	0.9608	0.9588	0.9626	0.8883
Prop. Main Office Team	0.9559	0.9588	0.9533	0.8492
Prop. Team 1	0.0534	0.0707	0.0374	0.2956
Prop. Team 2	0.2000	0.1633	0.2336	0.2075
Prop. Team 3	0.2123	0.2178	0.2072	0.8513
Prop. Team 4	0.1628	0.1731	0.1532	0.6946
Prop. Team 5	0.0441	0.0515	0.0374	0.6274
Prop. Team 6	0.2598	0.2990	0.2243	0.2287
Prop. Team 7	0.1373	0.1237	0.1495	0.5932
Prop. Team 8	0.0196	0.0206	0.0187	0.9217
Monthly Payment Goal (\$)	\$36,416	\$38,871	\$34,218	0.6389
Monthly Payment Agreement Goal over contact	0.1698	0.1762	0.1641	0.5710
Burnout indicator	0.3870	0.4123	0.3621	0.4367
Desertion final MBI-GS burnout survey	0.1870	0.1579	0.2155	0.2639
N	230	114	116	
Panel B: Second MBI-GS burnout survey (Phase 3)				
Prop. Women	0.7059	0.7604	0.6484	0.0947
Age (years)	36.1604	35.2292	37.1429	0.1137
Prop. Secondary Education	0.6364	0.6092	0.6629	0.4618
Prop. College Education	0.2898	0.3333	0.2472	0.2105
Company Tenure (years)	8.9403	8.7241	9.1517	0.7132

Job Title: Prop. Collection Agent	0.9091	0.9195	0.8989	0.6355
Prop. Onsite Job	0.9545	0.9540	0.9551	0.9739
Prop. Main Office Team	0.9545	0.9655	0.9438	0.4913
Prop. Team 1	0.0452	0.0568	0.0337	0.4627
Prop. Team 2	0.1932	0.1494	0.2360	0.1469
Prop. Team 3	0.1875	0.2069	0.1685	0.5176
Prop. Team 4	0.1639	0.1828	0.1444	0.4856
Prop. Team 5	0.0398	0.0575	0.0225	0.2395
Prop. Team 6	0.2670	0.2759	0.2584	0.7953
Prop. Team 7	0.1307	0.1264	0.1348	0.8697
Prop. Team 8	0.0114	0.0115	0.0112	0.9872
Monthly Payment Goal (\$)	\$38,728	\$38,765	\$38,692	0.9947
Monthly Payment Agreement Goal over contact	0.1667	0.1748	0.1588	0.4745
Burnout indicator (profiles)	0.4652	0.5729	0.3516	0.0023
Burnout score	2.47	2.57	2.36	0.0894
Participation in intervention	0.1711	0.0521	0.2967	0.0000
N	187	91	96	

Table 3 presents the mean characteristics of the call center's employees by phase: for phases 1 and 2, employees who participate in the project (Panel A), and for phase 3, all employees that complete the final MBI-GS burnout survey (Panel B). Columns 3 and 4 show the mean values for the control and treatment groups. Column 6 presents the p-value from a test of differences of means. The two groups have similar demographic and work characteristics in both phases, treatment assignment is balanced. The last row from Panel B shows the participation rate for each group, participation in the online board to share experiences is one of the outcomes of interest, so it is expected have different participation rates between groups if the instrument used to encourage the treatment group has some effect on participants. The comparison between the results of Panel A and Panel B shows that the sample of call center agents who responded to the survey maintains the same average characteristics as the total sample of workers. It is not found that the probability of

responding to the survey is correlated with other observable characteristics of the individuals.

IV. Empirical Strategy

I estimate the effect of burnout on workers' productivity using an instrumental variables design. I exploit random assignment to nudge participation as an instrument to explore if sharing experiences with peers could reduce burnout and the effect of these changes in burnout on workers' productivity measures. The relevance assumption, the exclusion restriction, and the monotonicity assumption are the three identification assumptions to estimate the causal effect. The relevance assumption requires a strong correlation between the randomized encouragement and the treatment. In this case, employees should be more likely to participate on the online board to share professional experiences when encouraged than when they are not. The exclusion restriction entails that the encouragement must not directly or indirectly affect burnout. Participation in the three-week intervention mediates all the influence of the encouragement. Finally, the monotonicity assumption ensures that the instrument operates in a unidirectional manner and there is no one who exhibits behavior that contradicts their assigned treatment status. If this assumption holds, it is anticipated that all individuals who would have participated in the online platform under the control group condition would also participate when encouraged to do so as part of the treatment group (Angrist et al., 1996).

The estimation has three steps: first, estimate the effect of nudges on individual participation in the platform to share professional experiences. Second, estimate the effect of participation in the online platform to share experiences on the burnout level.

The final effect to be estimated is the impact of changes in the burnout level on worker productivity outcomes.

I am interested in estimating the effects of participating in the program on two outcomes: burnout and productivity. For employee i , the effect of participation in the intervention on burnout is estimated as:

$$\mathbf{Burnout}_i = \pi + \theta \widehat{\mathbf{Participation}}_i + e_i \quad (1)$$

Where $\mathbf{Burnout}_i$ is either the burnout score or a dummy burnout indicator, measured with the MBI-GS questionnaire and $\widehat{\mathbf{Participation}}_i$ is a dummy variable that indicates if individual i have at least 1 access to the online board to share professional experiences with peers.

I estimate the average effect of changes in employee i 's burnout on his productivity measures:

$$\mathbf{Y}_i = \rho + \beta \widehat{\mathbf{Burnout}}_i + u_i \quad (2)$$

Where β represents the causal effect of burnout on each outcome variable $\mathbf{Y}_i$: Compliance with the amount of payment goal and compliance with the number of payment agreement goals on debtors contacted. Following the IV design, the first stage of both (1) and (2) exploit random assignment to nudge participation as an instrument of participation in the online platform to share experiences:

$$\mathbf{Participation}_i = \gamma + \alpha \mathbf{Treat}_i + v_i \quad (3)$$

$$\mathbf{Burnout}_i = \gamma + \alpha \mathbf{Treat}_i + v_i \quad (4)$$

Where ***Participation_i*** is a dummy variable that indicates if individual *i* have at least 1 access to the online board. ***Treat_i*** is an indicator of being in the treatment group, where participants receive intense messages, notifications, and reminders to nudge their participation in the platform. Thus, ***α*** represents the effect of random encouragement on employee participation and burnout, respectively.

V. Results

A. Effect of three-week intervention to share professional experiences on burnout

Table N° 4 shows the main results from Equations (1), (4) and (3) for two metrics of burnout: burnout score and burnout indicator from the Leiter and Maslach (2016) scoring procedure. Column 1 reveals that being assigned to the treatment group resulted in a 24.46% increase in the probability of participating on the online board to share professional experiences. This effect is statistically significant at the 1% level and shows a strong change in the probability of accessing the platform for individuals who received daily notifications. The result described here is the same for either Panel A or Panel B, as it represents the first stage estimates.

One of the main threats to this identification strategy is that identification assumptions do not hold. The first challenge is that the instrument, which consists of sending daily notifications about the activity on the platform to the treated group, is not strong enough to generate changes in the participation of workers in the online platform. The relevance assumption is empirically testable by the F-statistic reported in table 4, the value of F-statistic is 21.80 so the instrument is considered relevant (Stock & Yogo, 2002).

Column 2 shows the results of reduced form, it presents the effect of being assigned to the treatment group on burnout score (Panel A) or on having burnout (Panel B). The estimate in Panel A, 1 indicates that being in the treatment group decreases the burnout score by 0.21 points, significant at the ten percent level. Results in Panel B show a stronger effect, the treatment group decreases burnout by 22.13%, significant at the one percent level. This negative effect was expected if the individuals assigned to the treatment group participated more in the intervention, and the intervention increases employee-perceived social support.

Column 3 presents estimates from Equation (1). From the IV estimate in Panel B I conclude that participating in the online platform to share professional advice and experiences reduced burnout in 0.9 and is statistically significant at the 1% level. From Panel A, the estimates indicate that participating in the sharing experiences decreased the burnout score by 0.86 points compared to the control. The effect is negative and statistically insignificant. The OLS estimate in Column 3 also suggests a negative effect in burnout for both burnout metrics, the magnitude of the effect is smaller than the IV estimates. This shows that OLS estimates can be downward biased.

Table N° 4: Effects of intervention on burnout

	First Stage	Reduced Form	OLS	2SLS
A. Burnout Score				
Assigned to treatment group	0.2446*** (0.0533)	-0.2095* (0.1227)		
Participation in intervention			-0.03823 (0.1628)	-0.8565 (0.5376)
F-value	21.795			
N	187	187	187	187
B. Burnout indicator (profiles)				
Assigned to treatment group	0.2446*** (0.0533)	-0.2213*** (0.0704)		
Participation in intervention			-0.2597*** (0.0869)	-0.9045*** (0.3284)
F-value	21.795			
N	187	187	187	187

* p<0.1 ** p<0.05 *** p<0.01

Notes: Standard errors in parentheses.

I can also investigate heterogeneous effects across individuals' characteristics. Figure x presents the heterogeneous effects, IV estimates of participating in the online board to share professional stories on the burnout score. It is difficult to find significant differences between the groups, since when separating by their demographic characteristics the number of individuals is reduced and for most cases the instrument loses strength and becomes a weak instrument (F-value < 10). However, the main results highlight that women and individuals without college studies have a negative and statistically significant effect when participating in the intervention, which is not observed for their counterparts, men, and people with college studies. No significant differences can be determined by age groups.

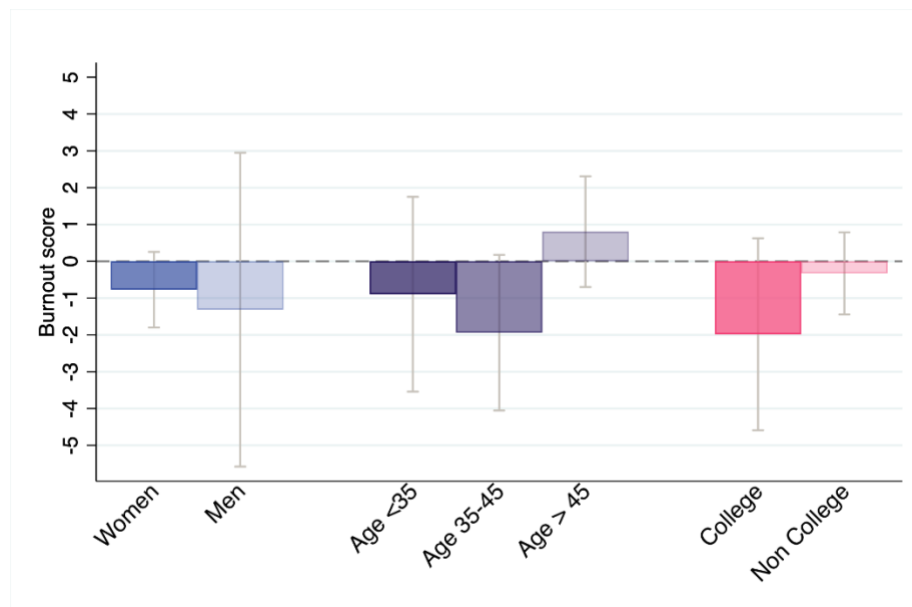


Figure N° 2: Heterogeneous effects of participating in sharing professional experiences on burnout score

To complement the analysis of heterogeneous effects found in burnout, it is useful to show the heterogeneous first stage estimates (see Appendix 5 Figure x). Results suggest that women, employees above 45 years, and individuals without college education are the groups that react with greater intensity to the treatment. For women, receiving daily notifications to encourage participating in the platform, increase participation by 29.79% for the treatment group if comparing with the control, the effect is statically significant at 1% level. Conversely, for men being in the treatment group participation increase only by 13.18% and is statically insignificant. By age groups, the three groups have a positive and statically significant effect at 5% level, but people above 45 years have the greater effect with an increase of 43.33% in participation. Finally, people who did not attend college education observed a growth of 28.49% in their participation if they received constant notifications for being assigned to the treatment group. In summary, the results indicate that the instrument of sending daily notifications to increase participation have differ in its effectiveness across demographic profiles.

B. Effect of burnout on worker productivity outcomes

The final outcome to consider is how changes in burnout levels affect workers' productivity. Table 5 shows the main results from Equations (2) and (4) for two metrics of productivity: compliance with the payment goal per agent and the compliance with the number of payment agreement goals on debtors contacted per agent. This estimate depends on the results for the reduced form shown in section a, which now corresponds to the first stage of the effect of burnout on productivity.

The first stage shows a small and non-significant effect of the treatment on the burnout score, column 1 for panels A and B presents these results. Being assigned to the treatment group is associated with a 0.20 point reduction in the burnout score, statistically significant at the 90% confidence level. However, for both payment goal compliance and payment agreement goal compliance, being in the treatment group is a weak instrument for driving significant change in burnout, the F-values in both cases being well below 10, which is considered the cutoff to determine that an instrument meets the materiality assumption. Since I have a weak instrument, it is not possible to make inferences about the punctual effect of the change in burnout on worker productivity measures.

The IV estimations (Column 4) shows that changes in the burnout have a negative impact with the workers productivity metrics. In panel A, the results show that an increase of 1 point in the burnout score translates into a 14.02% reduction in payment goal, and into a 35% drop in the compliance with the number of payment agreement goals on debtors contacted per agent. None of these effects is

statistically significant, and since the instrument is weak, they cannot be interpreted as causal effects.

Table N° 5: Effects of burnout on worker productivity outcomes

	First Stage	Reduced Form	OLS	2SLS
A. Compliance with payment goal				
Assigned to treatment group	-0.2095* (0.1227)	1.6999 (1.3673)		
Burnout			0.3948 (0.6718)	-14.0236 (18.4471)
F-value	1.758			
N	187	187	187	187
B. Compliance with the number of payment agreement goal on debtors contacted				
Assigned to treatment group	-0.2095* (0.1227)	-1.2204 (1.7421)		
Burnout			2.9833*** (1.0817)	-35.0536 (546.4309)
F-value	1.758			
N	187	187	187	187

* p<0.1 ** p<0.05 *** p<0.01

Notes: Standard errors in parentheses.

i. Nonparametric bounds of the average treatment effect of burnout on workers' productivity outcomes

As shown in section c, being assigned to the treatment group was a weak instrument to generate significant changes in the burnout score. A weak instrument means that

the estimation is not meeting the relevance assumption, thus it is not possible to identify a punctual causal effect of burnout on workers' productivity outcomes. However, there is still a way to infer the average treatment effect of burnout. For this, I follow Manski (1995, 1997) to define nonparametric bounds for compliance with the payment goal per agent and the compliance with the number of payment agreement goals on debtors contacted per agent.

Using bounds helps to create conservative assumptions and establish upper and lower limits for the treatment effect. This includes assuming a monotone treatment response (MTR). Monotonicity in this case assumes that all call cent agents who increase their productivity outcomes under the control group would also increase when being assigned to the treatment group. Specifically, reducing burnout in people does not have a negative impact on their productivity. An instrumental variable design can help narrow down these bounds and provide valuable information about the effect.

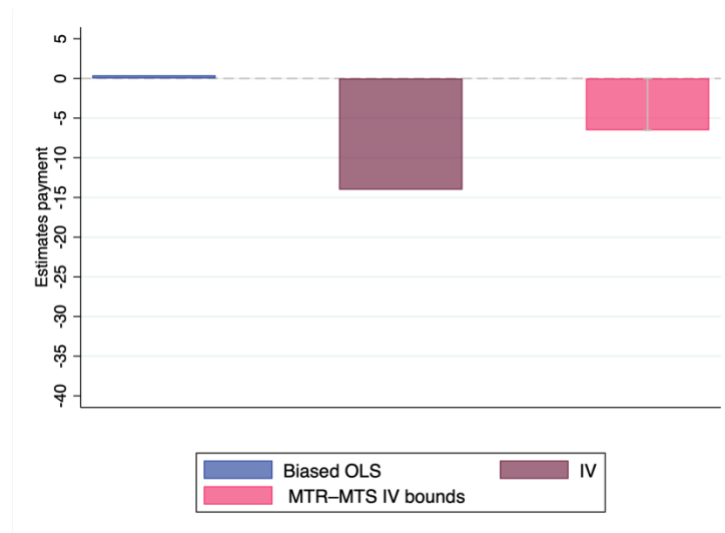
I estimate the nonparametric bounds for the effects of burnout on compliance with the payment goal and the compliance with the number of payment agreement goals on debtors contacted assuming MTR. Using a bias-corrected percentile bootstrap with 300 replications, I calculated the 95% confidence interval for the latter bound. Figure 3 presents these results.

As shown in Figure 3 panel (a), the MTR IV lower bound for the effect on compliance with payment goal is -6.54 percentage points (95% CI= [-26.14%, 13.06%]). These bounds indicate that the effect of increasing one point of burnout score on compliance with payment goal is no greater than -6.54 percentage points.

Additionally, the upper bound is zero because we are assuming that treatment did not have a negative impact on productivity. If I compare the three estimates presented in Figure 3, bound are useful to narrow an interval in which the effect may stand. Figure 3 panel (b) shows the same result for the effect on compliance with the number of payment agreement goals on debtors contacted, the effect of increasing one point of burnout on compliance with payment agreement goals is no greater than -14.30 percentage points (95% CI= [-39.59%, 10.99%]).

These results show that reducing burnout may increase workers' productivity outcomes. The bounds estimate shows that the reduction of 1 point in burnout increases workers' productivity metrics between 6 and 14 percentage points. The estimates are in line with what was expected following Linos et al. (2022)

(a) Compliance with the payment goal per agent



(b) Compliance with the number of payment agreement goals on debtors contacted per agent

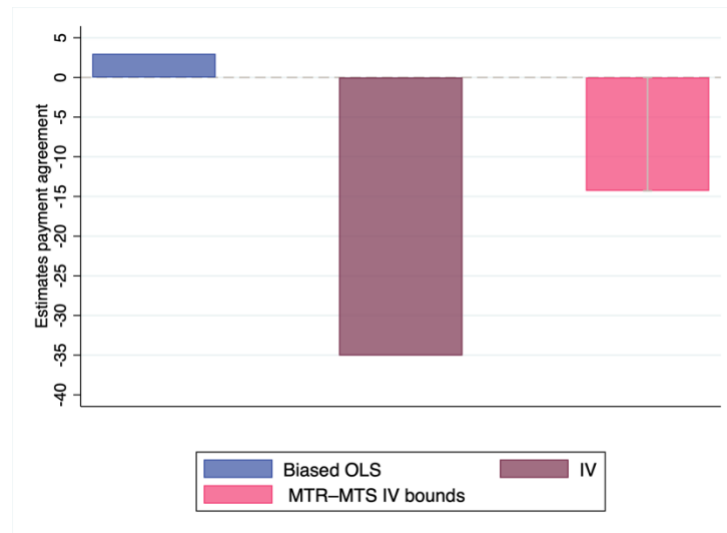


Figure N° 3: Bounds for the effect of burnout on workers' productivity outcomes

VI. Conclusions

Burnout has a negative correlation with worker productivity. However, we have little causal evidence on this relation. Exploiting a natural field experiment in the call center of a collection company in Ecuador I give an estimate of the effect of burnout on workers' productivity outcomes. With a final sample of 187 employees, and a power of 80%, I was able to detect effects up to 0.4130 percentage points in the workers' productivity measures at the 5% level.

Reducing burnout may have a positive impact on workers' productivity. My findings provide support for the effects of random encouragement design intervention on burnout and the effects of changes in burnout on workers' productivity outcomes. First, participating in an intervention where call center agents share experiences and read about peers' professional advice decreased the burnout score by 0.86 points, the effect is statistically significant at 90% level of confidence. Despite having a small change in burnout, and therefore a weak instrument for the estimation of the effect of burnout on workers productivity, I can still learn about the effect by estimating

nonparametric bounds. Following Manski (1995, 1997) and assuming a monotone treatment response (MTR), bounds estimation shows that a one-point reduction in burnout may impact in the increase of 6 percentage points to 14 percentage points of workers' productivity outcomes.

These results have significant implications for firms and employers. I provide causal empirical support of a low-cost intervention that can cause reductions in burnout by increasing the perceived social support in employees. Burnout reduction not only increases individuals' well-being, but also impacts firms' results by potentially improving workers' productivity outcomes. Additionally, I found evidence that Linos et al. (2022) is effective for in other settings.

I don't have conclusive evidence on the effect of burnout on workers productivity because of the poor correlation between the treatment and the changes on the burnout score for participants. Future studies could extend the time of the intervention or use another type of setting in which people can share with each other more directly and then observe changes in burnout. With a longer period, or an instrument that has greater power to change the perceived social support of the participants effects on workers' productivity outcomes may be more concluding.

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APPENDIX

Appendix

Appendix 1: Treatment and control message text, baseline MBI-GS survey

A graphic for a survey announcement. It features a light blue background with a blurred image of a hand holding a smartphone. At the top right, there is a 3D illustration of a purple pillbox with three white pills, two of which have green checkmarks. Below this, an orange banner contains the text 'ENCUESTA DE BIENESTAR EN EL TRABAJO' in white, bold, uppercase letters. To the right of the banner is a green circular icon with a white checkmark. Below the banner, the text 'Participa en nuestra encuesta de bienestar laboral y ayúdanos a mejorar tu experiencia en el trabajo.' is displayed in dark blue. This is followed by 'Tu opinión nos será de gran ayuda para alinearnos a tus necesidades y encontrar puntos de mejora.' in a smaller dark blue font. A dark blue banner at the bottom of the main content area contains the text 'COMPLETA LA ENCUESTA ANTES DEL LUNES 26 DE JUNIO' in white, bold, uppercase letters. Below this banner, the text '¡Gracias por tu colaboración y compromiso!' is shown in dark blue. At the very bottom, a light blue banner contains the text 'Importante: El cuestionario estará habilitado entre el jueves 22 de junio y el lunes 26 de junio.' in dark blue.

ENCUESTA DE BIENESTAR EN EL TRABAJO

Participa en nuestra encuesta de bienestar laboral y ayúdanos a mejorar tu experiencia en el trabajo.

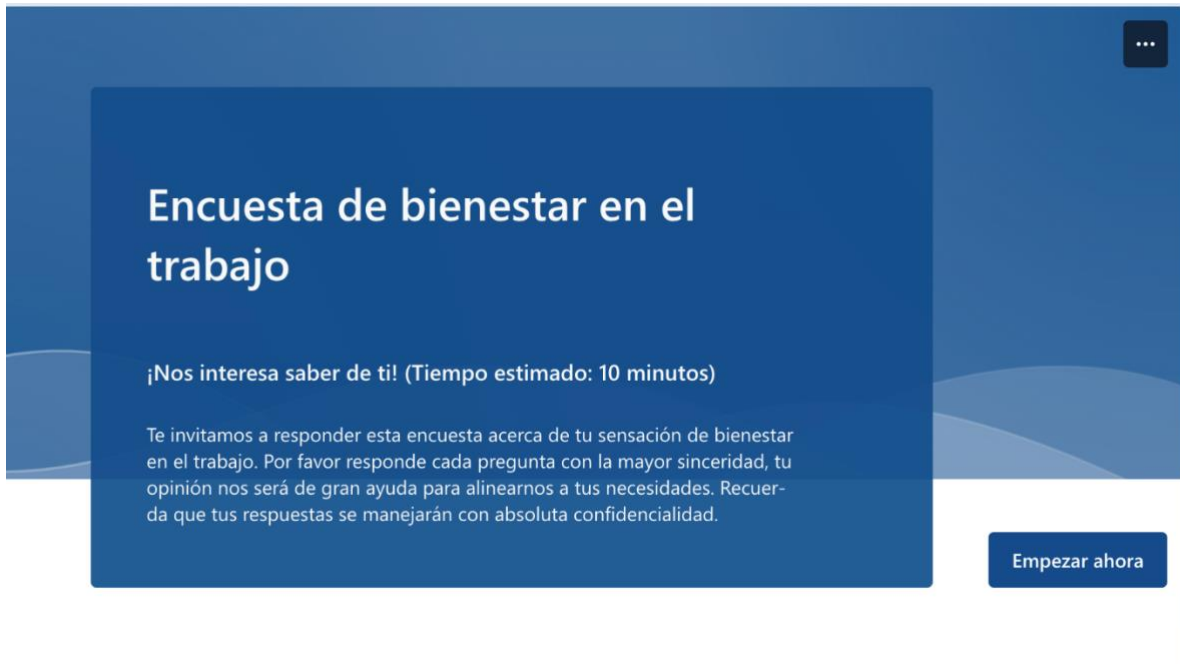
Tu opinión nos será de gran ayuda para alinearnos a tus necesidades y encontrar puntos de mejora.

COMPLETA LA ENCUESTA ANTES DEL LUNES 26 DE JUNIO

¡Gracias por tu colaboración y compromiso!

Importante: El cuestionario estará habilitado entre el jueves 22 de junio y el lunes 26 de junio.

Appendix 2: MBI-GS survey



...

Encuesta de bienestar en el trabajo

¡Nos interesa saber de ti! (Tiempo estimado: 10 minutos)

Te invitamos a responder esta encuesta acerca de tu sensación de bienestar en el trabajo. Por favor responde cada pregunta con la mayor sinceridad, tu opinión nos será de gran ayuda para alinearnos a tus necesidades. Recuerda que tus respuestas se manejarán con absoluta confidencialidad.

Empezar ahora

5. *

Nunca Pocas veces al año Una vez al mes o menos Unas pocas veces al mes Una vez a la semana Unas pocas veces a la semana Todos los días

Me siento fatigado(a) al levantarme por la mañana y tener que enfrentarme a otro día de trabajo

☐☐☐☐☐☐☐

6. *

Nunca Pocas veces al año Una vez al mes o menos Unas pocas veces al mes Una vez a la semana Unas pocas veces a la semana Todos los días

Sólo quiero hacer mi trabajo y que no me molesten

☐☐☐☐☐☐☐

7. *

Nunca Pocas veces al año Una vez al mes o menos Unas pocas veces al mes Una vez a la semana Unas pocas veces a la semana Todos los días

Soy capaz de resolver adecuadamente los problemas que surgen en mi trabajo

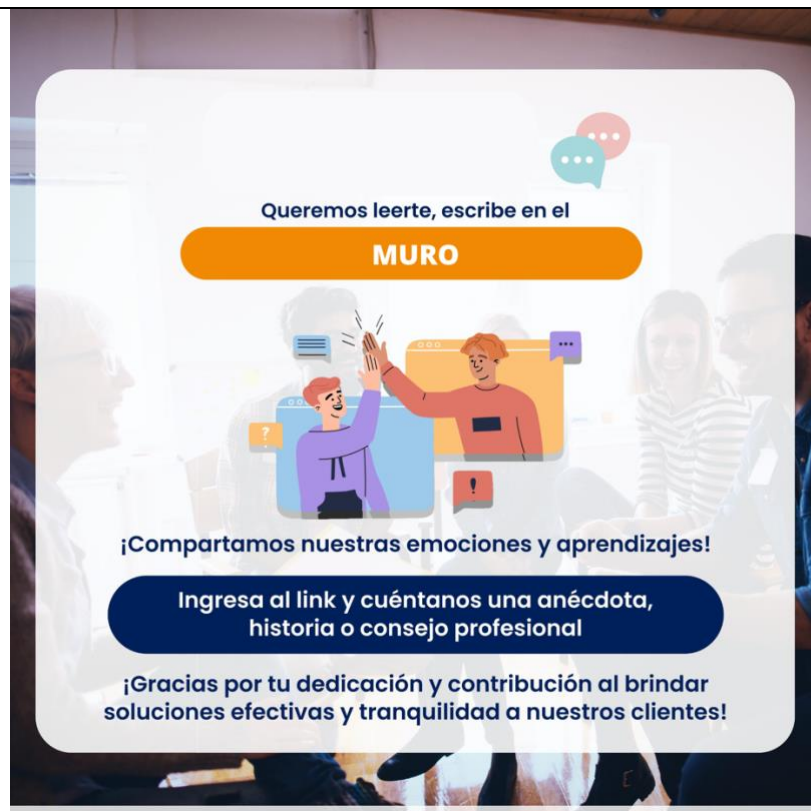
☐☐☐☐☐☐☐

Appendix 3 Table 6: Treatment and control message text, online board intervention

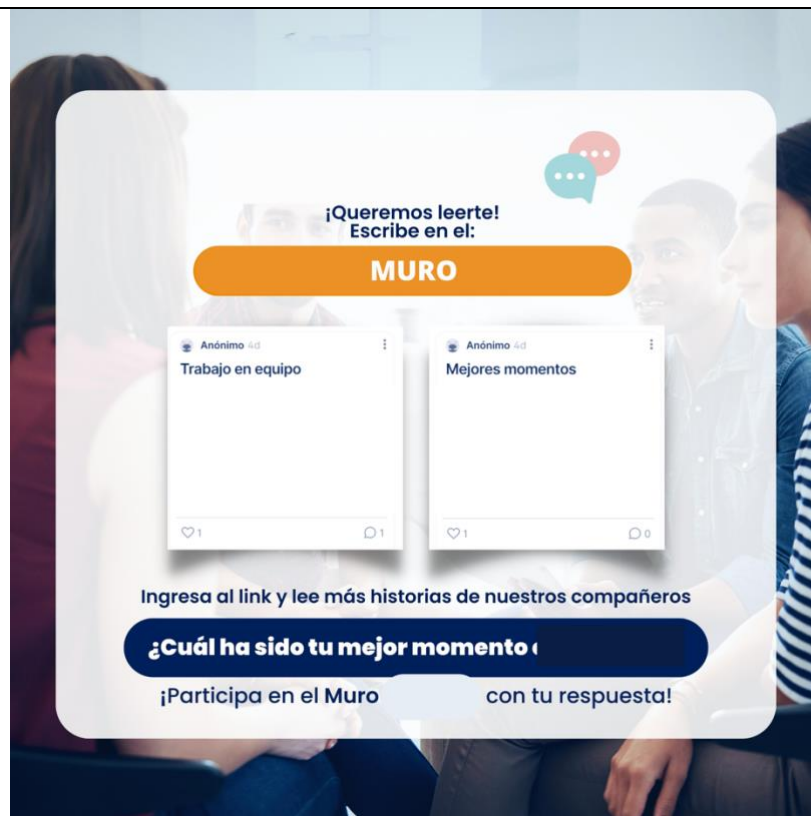
Each message was sent by a member of the company's Human Resources Team.

Initial Intervention Invitation - Control	
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Initial
Intervention
Invitation -
Treatment



Example of daily
notifications -
Treatment



Appendix 4 Table 7: Summary Statistics MBI scale by group

	N	%	Exhaustion	Cynicism	Efficacy
Burnout	69	36.90%	2.45	1.65	5.52
Overextended	18	9.63%	1.79	0.15	5.84
Ineffective	24	12.83%	0.58	0.78	5.07
Disengaged	3	1.60%	0.63	2.07	5.94
Engagement	73	39.04%	0.42	0.13	5.31
Overall	187	100.00%	1.32	0.81	5.42

Appendix 5 Figure 4: Heterogeneous first stage estimates for the effect of being assign to the treatment group on participating in the online platform to share professional experiences

