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## Improving Health and Safety in the Informal Sector: Evidence from a Randomized Trial in Bangladesh

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# Improving Health and Safety in the Informal Sector: Evidence from a Randomized Trial in Bangladesh

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## ABSTRACT

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# Improving Health and Safety in the Informal Sector: Evidence from a Randomized Trial in Bangladesh\*

Workers in small businesses in low- and middle-income countries are exposed to significant risks of occupational accidents and illnesses. A safe and healthy workplace could improve the productivity and sustainability of the business. In this paper, we conduct a randomized controlled trial in Bangladesh that provides informal firms with information on occupational health and safety (OHS) to improve their workplace practices. The intervention comprised two treatment arms: one focused solely on OHS training (the OHS arm), while the other offered business training and access to financing in addition to OHS training (the OHS+Biz arm). After two years, treated firms showed improvements in business practices, particularly those related to safety and a decent work environment. Moreover, both treatment arms experienced increased output and sales revenue. The OHS+Biz arm generally had no additional impact on firm outcomes compared to the OHS arm, suggesting that OHS information is the primary factor driving safer and healthier workplaces, which consequently can lead to better firm outcomes.

**JEL Classification:** J28, C93, J81, I15, M53, J24, O14

**Keywords:** occupational health and safety, enterprise training, randomized controlled trial, informal economy, information, credit access

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# 1 Introduction

Workplace accidents, illnesses, and fatalities impose substantial costs on economies. Globally, 1.9 million deaths and 90 million disability-adjusted life years in 2016 were attributable to exposure to occupational risk factors (WHO and ILO, 2021). Businesses and workers bear the impacts of hazardous work environments due to the costs associated with productivity losses and poor health caused by occupational hazards. However, owners and managers of small and medium-sized enterprises (SMEs) tend to perceive a trade-off between safety and profitability. Instead of a trade-off, there may be some complementarity between safety and operational efficiency (Pagell et al., 2015). An unsafe work environment puts workers’ well-being at risk. Workers’ well-being has been shown to affect their performance as well as the overall productivity of the firm (Oswald et al., 2015; Böckerman and Ilmakunnas, 2012). Basic conditions such as safety, hygiene, and a healthy physical environment are crucial for a productive work environment. Therefore, improving workplace health and safety not only protects workers but can also enhance firm productivity and profitability.

Standard economic theory assumes that occupational health and safety (OHS) practices are costly to the firm and solely benefit the workers. Under the assumptions of competitive labor markets, where information is perfect (so that both workers and owners are fully aware of workplace hazards and the costs and benefits of reducing hazards), workers are mobile, and contracts are fully enforced, workers who take on jobs with poor working conditions will demand higher wages (Thaler and Rosen, 1976; Brown, 1980; Arnould and Nichols, 1983). Safety regulations and inspections improve social welfare when the assumptions of competitive labor markets are violated (Levine et al., 2012; Li and Singleton, 2019). However, qualitative research shows that SME owners tend to lack awareness of the potential benefits of a safe work environment and the cost implications of work-related sickness and injuries.<sup>1</sup> SME owners’ varying beliefs regarding the relationship between safety productivity and may limit investments in OHS measures.

Existing policy discussions have focused on the importance of establishing and enforcing safety regulations (WHO, 1995) and the potential role of monitoring by transnational corporations in global supply chains (Short et al., 2020). However, the majority of the workforce in low- and middle-income countries (LMICs) are employed in SMEs in the informal sector,<sup>2</sup> where workers have limited social protection and are exposed to high rates of occupational hazards (WHO, 1995; Hogstedt et al., 2007). The potential complementarity between safety and productivity may have important implications for workplace safety management in the informal sector in LMICs.

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<sup>1</sup>See, for example, Haslam et al. (2010) and Meité et al. (2009).

<sup>2</sup>SME here is taken to include micro-enterprises. Throughout this paper, we adopt the ILO’s definition of the informal economy as “all economic activities by workers and economic units that are - in law or in practice - not covered or insufficiently covered by formal arrangements” and the informal sector as “a group of production units comprised of unincorporated enterprises owned by households ... (typically small and non-registered enterprises).” (See: ILO, “4.5 Informal economy workers,” accessed April 25, 2023, [https://www.ilo.org/global/topics/wages/minimum-wages/beneficiaries/WCMS\\_436492/lang--en/index.htm](https://www.ilo.org/global/topics/wages/minimum-wages/beneficiaries/WCMS_436492/lang--en/index.htm)).

We investigate whether entrepreneurs’ lack of OHS awareness and OHS knowledge is a barrier to firm growth and profitability in LMICs, in the same vein as lack of managerial capital or knowledge to run a business impedes firm growth and profitability (Bloom and Van Reenen, 2007; Bloom et al., 2013; Bruhn et al., 2018). We test whether OHS training improves SMEs’ business practices (particularly those related to safety and health), work environment, and firm performance. We do so using a cluster randomized controlled trial among SMEs in the light engineering (LE) industry in Bangladesh to estimate the causal impact of OHS training on firms’ practices and performance. We collaborated with BRAC, the largest southern-based NGO in the world, which designed and implemented the training programs following the ILO’s training manual on safety, health, and work conditions (ILO, 1987).

Our study has two objectives. The primary objective is to examine whether the OHS training program improves firms’ business practices (particularly OHS practices) and firm performance. Additionally, we recognize that some firms may not be able to adopt the OHS practices after the OHS training due to poor management skills or credit constraints. Therefore, we also examine the potential complementarity between OHS training and a combination of business training and access to financing by offering some firms all three components at the same time. We implemented a cluster randomized controlled trial with 2,248 firms in 1,235 markets in Bangladesh. Randomization was carried out at the market level so that all firms in a market were either considered as part of a treatment or a control group. The markets were located in 79 sub-districts in 20 districts. All firms were in the light engineering industry (described in Section 2).

The experiment comprises two treatment arms and a control group. The first treatment arm (the OHS arm) involved 522 firms and provided intensive OHS training to the firm owner or manager. The OHS training involved three days of intensive classroom-based training followed by two half-day personalized sessions on firm-specific safety measures. The training included extensive coverage of safety-related topics (such as electrical safety, first aid, and personal protective equipment) and healthy work environment practices (such as providing filtered drinking water, clean toilets, and sufficient light and air flow). The training also addressed a limited set of human resources and management practices relevant to a pleasant work environment, including fair labor practices (such as timely payment and weekly time off), raw material management, waste management, and basic accounting practices.

The second treatment arm (the OHS+Biz arm) involved 504 firms. It provided firm owners OHS training, additional training on business management and financial linkages (henceforth, “business training”), and access to a low-interest loan. The business training consisted of three days of intensive classroom-based training followed by two half-day follow-up workshops in local committee settings. In addition to the typical business practices taught at traditional business training programs (such as financial planning and marketing strategies), the business training also offered extensive information on financial linkages (such as banks and microlenders) and market linkages (such as information on suppliers and potential buyers).

The interventions were carried out between October and December of 2017. A baseline survey

was conducted in September 2017, shortly before the interventions, and two follow-up surveys were carried out in December 2018 and December 2019. Treatment compliance was high (above 90 percent), survey attrition was low, and the baseline characteristics of firms and firm owners were relatively balanced across treatment groups. Firm owners were predominantly male, with an average of 7 years of formal education. The average employment size was 3.9, and the median was 3, including the owner. In all three rounds of surveys, we measured 41 business practices that were targeted by the OHS training program (including 15 safety practices, 14 work environment practices, 6 fair labor practices, 3 material management practices, and 3 accounting practices). To reduce reporting bias, we surveyed both the owner and the most senior worker at each firm about firm practices. The enumerator’s observations about firm practices were also recorded whenever possible. We also measured a range of firm outcomes, including employment, sales, profits, finished goods inventory, value of equipment, access to finance, and market linkages. In the two follow-up surveys, we also measured OHS awareness within the firm, workers’ perception of the work environment, owners’ attitudes toward business and life, owners’ perception of their own skills, and the rates of accidents and injuries at the firm.

We estimate the intention-to-treat effects of the interventions, pooling both rounds of follow-up surveys. We have three primary sets of results. First, we find that both interventions improved firms’ business practices, with large impacts on safety and basic accounting practices, moderate impacts on work environment and material management practices, and relatively small effects on fair labor practices. Specifically, the OHS intervention led to a 5.3 percentage point (pp) improvement in the overall business practices score and the OHS+Biz intervention led to a 5.8 pp improvement (relative to the control group implementing 62 percent of the best practices at baseline). The magnitudes of these effects are similar to the effects of traditional business training courses on micro and small enterprises found in the existing literature ([McKenzie and Woodruff, 2014](#)). Among the five practice areas, the effects are similar in magnitude across the two types of interventions in all but one area – fair labor practices, where the effects are larger in the OHS+Biz group than in the OHS group. These improvements in business practices were observed in the first follow-up survey (one year after the intervention) and persisted in the second follow-up (two years after the intervention).

Second, we find that both interventions increased firm output; the OHS intervention increased output without increasing employment or investment in equipment, thus having a positive impact on productivity; in contrast, the OHS+Biz intervention led to simultaneous increases in output, employment, and investment in equipment, but had no detectable impact on productivity. The OHS intervention increased annual sales by 13.1 percent across the two follow-ups (statistically significant); moreover, these effects increased over time – 9.7 percent at the first follow-up and 16.6 percent at the second follow-up. Similar patterns were found in monthly sales and monthly profits: small and statistically insignificant effects at the first follow-up, but large and statistically significant effects at the second follow-up. The OHS intervention also increased the finished goods inventory by 37.8 percent (statistically significant), with similar effects across the two follow-ups. Compared

to the OHS intervention, the OHS+Biz intervention had similar (albeit less precisely estimated) effects on sales and profits, but smaller effects on finished goods inventory. Additionally, the OHS intervention had small and statistically insignificant effects on employment and investment (as measured by the equipment value). In contrast, the OHS+Biz intervention had moderate effects on both, increasing equipment value by 8.4 percent and employment by 4 to 5 percent (both significant at the 10 percent level).

Third, we analyze other potential channels through which the interventions could have affected firm performance. We find that both interventions had positive impacts on firms’ market linkages, increasing the likelihood of sourcing raw material from a wider area and membership in trade organizations and business cooperatives. Both interventions improved firm owners’ self-assessment of their management skills (by 0.16 to 0.21 standard deviations relative to the control group), although we are unable to distinguish if this reflects improvements in actual skills or self-confidence in one’s skills. The OHS+Biz intervention also improved firm owners’ attitudes towards life (by 0.2 standard deviations relative to the control group), with improvements concentrated in three areas: sociability, conscientiousness, and patience.<sup>3</sup> The OHS intervention did not have a statistically meaningful impact on life attitudes. Both interventions had small and statistically insignificant effects on firm owners’ attitudes towards business, firms’ financial linkages, and the rates of accidents and injuries.<sup>4</sup>

Additionally, we also examine spillover effects to nearby untreated markets within the same market cluster (MC). We exploit the fact that some markets are located in clusters, resulting in a variety of treated and untreated markets within close geographical and social distances. We find that the spillover effects on the sales, profits, and output of nearby untreated firms are generally positive but statistically insignificant, which suggests that we can reject the presence of business stealing effects (that is, negative spillovers on the sales, profits, and output of nearby untreated firms). We find small and statistically insignificant spillover effects on most other outcomes, with two exceptions – the interventions improved the fair labor practices of nearby untreated firms, and the OHS+Biz intervention led to increases in the employment and total salary expenditure of nearby untreated firms. Unlike the case for sales, profits, and output, in terms of labor outcomes, our results suggest that there may be strong spillover effects operating through the local labor market.

To understand potential heterogeneities in treatment effects, we estimate quantile treatment effects. For most outcomes, we do not find any noticeable pattern of heterogeneity across the distribution. We also estimate heterogeneous effects by several baseline characteristics: owners’ education, owners’ age, employment, business practices score, sales, and profits. We find that the effects on firm owners’ business and life attitudes are concentrated on older owners and those with

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<sup>3</sup>These results are consistent with the existing literature. [Bruhn et al. \(2018\)](#) find that management consulting improved SME owners’ confidence in their management skills and their likelihood of setting long-term professional goals and working towards them.

<sup>4</sup>The reported rates of accidents and injuries were low at all firms. For instance, 90.4 percent of firm owners in the control group reported having zero accidents in their firms in the past year. Likewise, among the workers surveyed in the control group, 88.1 percent reported zero accidents in their firm in the past year.



fewer years of formal education.

We contribute to the literature on enterprise training programs and the role of managerial capital and credit constraints on SME growth. Micro and small enterprises in LMICs often suffer poor performance and slow growth. The literature suggests several barriers to profitability and growth: lack of knowledge to run a business (or what [Bloom and Van Reenen \(2007\)](#) and [Bruhn et al. \(2018\)](#) refer to as *managerial capital*), lack of access to credit ([Beck and Demirguc-Kunt, 2006](#); [De Mel et al., 2008](#); [Aragón et al., 2020](#)), and lack of confidence and motivation ([Lafortune et al., 2018](#); [Dalton et al., 2021](#)). Previous studies have examined various business training and consulting programs that aim to raise managerial capital. Their findings suggest that traditional business training programs (usually classroom-based and focused on accounting, marketing, and stockpiling) are effective in changing some business practices but insufficient to help small businesses grow ([McKenzie and Woodruff, 2014](#); [McKenzie, 2021](#); [De Mel et al., 2014](#); [Fiala, 2018](#)). Instead, interventions that provide tailored, individualized support through mentoring or consulting programs have shown more promising results in improving firm performance ([Bloom et al., 2013](#); [Brooks et al., 2018](#); [Bruhn et al., 2018](#); [Iacovone et al., 2022](#)). The impact on firm performance is also greater if training is targeted to the entrepreneur’s level of ability and sophistication ([Drexler et al., 2014](#); [Giné and Mansuri, 2021](#); [Calderon et al., 2020](#)).

We add to this literature by showing that entrepreneurs’ lack of managerial capital extends beyond accounting, marketing, and stockpiling. Entrepreneurs’ lack of OHS management skills may be an additional barrier to SME growth in LMICs. We show that OHS training can improve entrepreneurs’ OHS knowledge, and firms’ OHS practices, output, and productivity. The existing literature in operations management has demonstrated that safety management is an important aspect of good business practice and quality management, particularly for manufacturing sectors such as the LE industry we study ([Fernández-Muñoz et al., 2009](#)). Yet, safety management is often treated as non-essential and ignored by firm owners and managers.<sup>5</sup>

Compared to traditional enterprise training programs, the benefits of our OHS intervention extend beyond the sales and profits accrued to firm owners, as the improvements in working conditions also bring non-pecuniary benefits to the workers. Specifically, the enhancement in firms’ OHS practices and awareness could improve workers’ health and well-being, which we do not measure directly in this study. To put it differently, the social benefits of the OHS training programs are even larger than the returns to firm output we measure in this study. To this end, we also contribute to the literature on active labor market policy and post-schooling human capital investment in LMICs by focusing on human resource management in SMEs. Much of the literature on worker training in LMICs has focused on self-employment and vocational training ([Blattman and Ralston, 2015](#); [McKenzie, 2017](#); [Alfonsi et al., 2020](#); [Das, 2021](#)). Our results suggest that workers who are

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<sup>5</sup>Additionally, we also contribute to the literature on OHS interventions. There is limited empirical work in this area, which makes it difficult to draw conclusions about the cost-effectiveness of specific OHS interventions ([Grimani et al., 2018](#)). However, the principle that OHS improvements enhance firm productivity is well-accepted among practitioners and scholars of ergonomics ([Oxenburgh et al., 2004](#); [Fernández-Muñoz et al., 2009](#); [Pagell et al., 2015](#)). [Gupta and Upadhyay \(2012\)](#) show that safety measures have a positive effect on employee satisfaction. [O’Donnell \(2000\)](#) offers a conceptual framework that illustrates the linkages between health, safety, productivity, and profits.

already employed in the informal sector may benefit from additional OHS information.

The remainder of the paper is organized as follows. Section 2 presents a background of the LE sector in Bangladesh. Section 3 describes the intervention and the measurement of key outcomes. Section 4 presents the data and estimation strategy, followed by the results in Section 5. Section 6 concludes.

## 2 Context: The Light Engineering (LE) Sector in Bangladesh

This project focuses on a fast-growing but largely informal sector of the Bangladesh economy: the light engineering (LE) sector. The LE sector produces and supplies a wide range of metal spare parts (such as automobile and bicycle spare parts), casting, molds and dyes, oil and gas pipeline fittings, and small machinery to other manufacturing industries and the automobile sector; it also provides maintenance and repair services of electrical, electronic, and electromechanical products (Akhtaruzzaman et al., 2020). The sector provides vital support to all other primary industries (including manufacturing, agriculture, and various service industries). It has been named the “mother industry of all sectors” (Talukder and Jahan, 2017).

The LE sector is primarily comprised of small and medium enterprises (SMEs). A study in 2018 estimated that the sector consists of more than forty thousand units employing 0.8 million people (Akhtaruzzaman et al., 2020). The sector contributed to more than 2 percent of the country’s GDP in the last few decades and is one of the fastest-growing industries in Bangladesh (Quadir and Mahamud, 2009). Despite the fast growth rate, demand for LE products far exceeds domestic supply. Around half of the country’s demand for metal spare parts and small machinery is supported by imports rather than domestic production (Quadir and Mahamud, 2009; Akhtaruzzaman et al., 2020). The Bangladesh government has recognized the growth potential of the LE sector by naming it a thrust sector for development in Industrial Policy 2005 and 2009, a priority sector in Export Policy 2006-09 and 2009-12 (Ahmed and Bakht, 2010), a high priority sector in National Industry Policy 2016, and a special development sector in Export Policy 2018-22 (Rahman et al., 2022).

The majority of firms in the LE sector are informal. The sector is characterized by its high dependence on semi-skilled and unskilled labor, absence of formal rules and regulations, long and strenuous working hours, a lack of innovative work practices, and a lack of labor rights and employee benefits (Ahmed and Bakht, 2010; Akhtaruzzaman et al., 2020). Entrepreneurs in the sector typically have less than 10 years of formal education, similar to our sample. Workers typically work 11 hours per day and receive a monthly salary of 2 to 15 thousand takas (Ahmed and Bakht, 2010), which is just above the minimum wage of 1.5 thousand takas (about US\$18) per month. Entrepreneurs and workers typically learn their trade through work experience within the sector rather than formal vocational training (Hoque, 2016).

Past qualitative studies have found that the leading challenges for firm growth in this sector are a lack of skilled workforce and access to capital, particularly low-interest loans (Talukder and Jahan, 2017; Rahman et al., 2022). In addition, firms in this sector tend to use outdated technologies and are slow to upgrade their equipment (Hoque, 2016). Firms in our sample typically engage in

production processes that involve welding and the usage of hazardous chemicals and inflammable materials. Workers are exposed to potential physical injuries related to lifting heavy items, skin irritation and burns, and electric shocks.

## 3 Experimental Design

### 3.1 The Intervention

This project was conducted in partnership with BRAC, the largest southern-based NGO in the world. BRAC works with 110 million of the 160 million people living in Bangladesh across all 64 districts of the country. The interventions were designed and implemented by BRAC as part of a program that started at the end of 2017 – the Pro-poor Growth of Rural Enterprises through Sustainable Skills-development (PROGRESS) program. The program aimed at developing the LE sector in Bangladesh and provided OHS and business management training to owners of LE firms.

#### **The OHS Treatment**

In the first treatment arm (the OHS arm), owners or managers of the firms were invited to receive intensive OHS training on ways to improve workplace safety, health, and well-being. The program consisted of a 3-day classroom-based residential training module and two personalized sessions on firm-specific safety measures, each lasting half a day.

The 3-day classroom-based training module was delivered in a BRAC branch office in a group setting with 25 participants per group. It was officially named “Decent Work Environment” training and designed according to the ILO’s training manual on safety, health, and work conditions ([ILO, 1987](#)). The module involved watching a series of short videos on OHS measures, with small group discussions after each video led by a BRAC staff. Training recipients also received a handbook that explained the OHS measures in words and pictures. The module primarily focused on safety topics such as risks and hazards, electrical safety, fire safety, first aid, and personal protective equipment. It also included an extensive discussion of healthy work environment practices such as keeping the workplace clean and tidy, providing filtered drinking water and clean toilets, and maintaining sufficient light and air flow in the workplace. The module also covered a limited set of management practices relevant to a pleasant work environment, including raw material management, waste management, and basic accounting practices. In addition, the module included a brief discussion of Bangladesh labor laws regarding sick leave, weekly time off, overtime pay, and timely salary payment.

After the 3-day classroom-based training module, firms received two personalized sessions on firm-specific safety measures, conducted at or near the firm site approximately one and two months after the classroom-based training. The primary goal of these sessions was to address firm-specific safety hazards in the daily operations of each firm.

#### **The OHS+Biz Treatment**

The second treatment arm (the OHS+Biz arm) was designed to test the complementarity between OHS training and relaxing firms’ credit constraints. Firm owners or managers were invited to

receive the same OHS training as those in the OHS arm; additionally, they were invited to receive business training and were offered an opportunity to take a low-interest loan from a formal financial institution. Similar to the OHS training program, the business training also consisted of a 3-day classroom-based residential training module and two half-day follow-up workshops.

The business training program focused on assisting with financial linkages and value chain development with the ultimate goal of enabling entrepreneurs to expand their businesses. Topics covered include marketing, pricing, customer service techniques, financial planning (including accounting and budgeting), business risk mitigation, business growth strategies, and types of capital (such as bank loans and micro-credit). BRAC Microfinance and other financial services providers facilitated the provision of financial products, including loans, insurance, and savings. Treated firms were offered a loan of \$500 from BRAC Microfinance at below-market interest rates. The follow-up workshops aimed at motivating firm owners to practice the lessons they learned during the 3-day residential training.

### **The Costs of the Training Program**

All training programs and sessions were offered to participants without charge. For the 3-day classroom-based residential OHS or business training component, participants also received food and accommodation without charge, an honorarium of 500 takas per day (approximately 6 USD), and a travel allowance of 1,000 takas. The total cost of each 3-day classroom-based training program was 7,928 takas per participant (approximately 100 USD), which includes the cost of food, accommodation, the daily honorarium, and the transportation allowance. Each of the follow-up sessions costs 2,500 takas per participant (approximately 31 USD). The total cost of the OHS training program, which includes a 3-day residential training and two follow-up sessions, was 12,928 takas per participant (approximately 162 USD). Similarly, the total cost of the business training program was also 12,928 takas per participant.

All classroom-based training and follow-up sessions were conducted by a pool of technical quality specialists and field technical officers trained by BRAC before the start of the experiment. The residential nature of the classroom-based training helped ensure the high participation rate. The training instructors also maintained contact with the training participants shortly after the 3-day training to ensure continued participation in the follow-up workshops. We discuss training take-up in Section 4.2.

## **3.2 Implementation and Timeline**

Our partner organization, BRAC, identified and recruited 2,451 LE firms from 1,356 marketplaces to take part in the experiment. These firms were located in 79 sub-districts from 20 districts of Bangladesh.

### **Randomization**

The randomization was conducted on a computer in August 2017, before the start of the baseline survey. Randomization was carried out at the market level so that all firms in a market were

either assigned to a treatment or a control group. The 1,356 marketplaces initially recruited for the experiment were randomized into three groups: 330 markets were randomly selected into the OHS arm, 320 markets in the OHS+Biz arm, and the remaining 706 markets formed the control group.<sup>6</sup> This market-level randomization process yielded 1,172 firms in the treated group, with 597 in the OHS arm and 575 in the OHS+Biz arm, and 1,279 firms in the control group. However, around 9 percent of markets (and firms) were lost before the baseline survey and did not participate in the experiment. Our final analysis sample consisted of firms that participated in the baseline survey.

## **Baseline Survey**

The baseline survey was conducted in September 2017 before the commencement of the interventions. We were only able to collect data from 2,248 firms during the baseline survey.<sup>7</sup> These 2,248 firms form the sample for this study. They are from 1,235 markets, with 522 firms in the OHS arm, 504 firms in the OHS+Biz arm, and 1,222 firms in the control group.

## **Intervention and Follow-up**

The interventions were implemented between October and December 2017. Firms were not informed of their treatment status prior to the intervention, and the training instructors were not given the list of firms in the control group. The first follow-up survey (i.e., the midline survey) was carried out in December 2018, about a year after the intervention. The second follow-up survey (i.e., the endline survey) was conducted in December 2019, about two years after the intervention.

During each survey, the enumerator first interviewed the owner or manager of each firm to collect information on firm characteristics such as the owner’s age and education level, the number of employees, costs and revenue, access to finance, market linkages, OHS awareness, and business practices at the firm. For firms with at least one worker present on the day of the interview, the enumerator then interviewed the most senior worker about business practices and OHS awareness at the firm. Additionally, the enumerator also observed business practices at the firm and recorded their assessment of the practices (whenever observable).

Additional questions were added during the follow-up surveys, including questions regarding the OHS awareness at the firm and the incidence of accidents and injuries during the last year (answered by both the owner and the worker). Workers were also asked to rate the level of improvement in the work environment over the last year. Firm owners were asked a series of questions regarding their attitudes toward business and life and their self-assessed management skills.

## **3.3 Measurement of Key Outcomes**

### **OHS Practices and Management Practices**

We measure firms’ OHS practices and a set of management practices that were targeted by the OHS training program. OHS practices were measured in terms of 35 individual practices and classified

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<sup>6</sup>All firms in the control group as well as 1,857 firms from 22 other districts of Bangladesh were scheduled to receive the OHS training at a future date after the completion of this study.

<sup>7</sup>Of the 203 firms that were lost before the baseline survey, 101 refused to participate in the study; another 102 could not be contacted during the baseline survey.

into three areas: safety practices (consisting of 15 individual practices covering electrical connection, machinery, and safety-related tools), work environment practices (14 practices covering workspace cleanliness, light and air flow, and drinking water and sanitation), and fair labor practices (6 practices covering timely pay and rest days). We measure 6 individual management practices in two separate areas: material management practices (3 practices covering the storage and management of waste and raw materials) and accounting practices (3 practices covering the maintenance of records for income, expenditure, raw material, and sales). Each practice is coded such that 1 indicates the best practice is adopted (e.g., electric connection is checked daily) and 0 indicates the worst practice is adopted (e.g., electric connection is checked less than once a month). Scores are then averaged within each area so that the summary scores measure the percentage of best practices adopted within the area of practice. Finally, we take the average score across all 41 individual practices to form the summary measure of overall business practices. [Appendix 2](#) provides details of the questionnaire items used to measure business practices. All 41 practices (including material management and accounting practices) were addressed by the OHS training program.<sup>8</sup>

### **OHS Awareness and Workers’ Perception of the Work Environment**

We measured owners’ and workers’ knowledge and attitude toward workplace safety (henceforth, “OHS awareness”) in the two follow-up surveys. These were measured using 15 questions, which we classified into two areas: safety knowledge and awareness at the workplace (7 items, henceforth, “safety knowledge”) and the safety discussion and feedback process within the firm (8 items, henceforth, “safety discussion”). The “safety knowledge” questions focus on safety protocols, safety training, and firm members’ knowledge about safety measures. The “safety discussion” questions examine safety-related leadership and the extent of safety-related discussions and interactions between firm owners and workers, which could be an important component of how OHS measures are implemented in the workplace ([von Thiele Schwarz et al., 2016](#); [Zohar, 2002a,b](#)).<sup>9</sup> Each item is coded such that 1 indicates that the interviewee (i.e., the owner or the worker) completely agrees with the statement (e.g., safety is frequently discussed in the workplace), 0.5 indicates partial agreement, and 0 indicates disagreement. Scores are then averaged within each area so that the summary scores measure the degree of OHS awareness at the firm.

In the two follow-up surveys, we also measured workers’ perceptions of improvements in their work environment over the past year. The (most senior) worker was asked to rate on a scale of 0 to 10 the level of improvement in the work environment, with 0 indicating no improvements at all

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<sup>8</sup>Material management practices (including waste management and raw material management) were addressed in the OHS training program as they were relevant for reducing fire hazard and improving the work environment. Accounting practices (including income-expenditure accounting and raw material accounting) were also addressed in the OHS training program as they were relevant for keeping a systematic record of the firm’s financial information and providing a professional work environment.

<sup>9</sup>The responsibilities of ethical leaders have been summarized as “the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement, and decision-making” ([Brown et al., 2005](#)). [Bedi et al. \(2016\)](#) show in their meta-analysis that employees working under ethical leadership demonstrate positive behavior and willingness toward organizational citizenship; they also achieve higher work satisfaction. [Chughtai et al. \(2015\)](#) show that fostering ethical leadership can improve employees’ well-being.



and 10 indicating the highest level of improvement possible.

### **Firm Outcomes: Employment, Sales, Profits, Output, Investment, and Productivity**

It is often difficult to measure the profits and sales of small firms as self-reported performance measures often contain substantial noise (De Mel et al., 2009; Anderson et al., 2019). Therefore, we use several measures of firm employment and output to examine firm growth and performance. To summarize the multiple measures within each group of outcomes, we construct summary indices for each category of outcomes following Kling et al. (2007).<sup>10</sup> Using the indices also addresses concerns due to multiple hypothesis testing. Additionally, for all employment and earnings-related variables, we use the log-transformed measures when the variable does not contain any zero-valued observations and the inverse hyperbolic sine (IHS) transformed measures whenever the variable contains zero- or negative-valued observations (Burbidge et al., 1988; Bellemare and Wichman, 2020).

Total employment at the firm is the sum of all salaried and unsalaried staff, including the owner and temporary workers or apprentices (if any). Three measures of firm employment were included – current employment (at the time of each survey), average employment last year, and total monthly salary for current staff. We use both the levels and log- (or IHS-) transformed versions of each variable as outcomes. These six variables (the three employment measures and their log or IHS transformations) were combined to construct an aggregate employment index. We also constructed two measures of worker retention – the number and the percentage of workers retained from the previous year.

Two measures of sales revenue were included – annual sales (sales last year) and monthly sales (sales last month). Two other measures of firm output were included – monthly profits (profits over the last month) and finished goods inventory (the value of produced saleable products). These four variables (annual sales, monthly sales, monthly profits, and finished goods inventory) were combined to construct an aggregate output index. One measure of firm investment was included – the value of equipment at the firm. For each of these sales/profits/inventory/equipment variables, we consider three separate forms as outcome variables: the IHS transformation, the level, and the winsorized level (winsorized at the 1st and the 99th percentile). Additionally, we also construct a measure of firm productivity as the residual of regressing IHS (or log) annual sales on IHS (or log) current employment and IHS (or log) equipment value.

### **Other Outcomes**

**Access to Finance, Market Linkage, and Owner’s Attitudes and Skills** Information on each firm’s access to finance and market linkages was collected during the baseline and follow-up surveys. These include whether firms took any formal or informal loans, utilized banking

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<sup>10</sup>Specifically, we first standardize each measure by subtracting the mean and dividing by the standard deviation of the control group. The index is then computed by summing up the standardized z-score of each measure within the outcome group. As such, each index is standardized so that the control group would have a mean of zero and a standard deviation of one. We also equalize signs across outcomes so that higher values of the indices represent better outcomes.

and mobile banking services, where firms sell products to and source inputs, and membership in trade organizations and business cooperatives. We summarized these items as the financial and market linkage indices. Information on firm owners’ attitudes toward business and self-assessed management skills was collected in both rounds of follow-up surveys, whereas information on their attitudes toward life was collected in the endline survey. The business attitude index summarizes 8 survey questions regarding entrepreneurial aspirations, long-term planning, and attitudes toward risk, clients, and networking. The life attitude index summarizes 15 survey questions regarding sociability, conscientiousness, patience, extroversion, resilience, perseverance, agreeableness, risk appetite, self-confidence, and creativity. The list of items used to calculate each index is listed in [Appendix 2](#).

**Accidents and Injuries** During the follow-up surveys, firm owners and workers were asked two questions about accidents and related injuries: “How many accidents took place in your workshop last year?” and “How many were injured in those accidents?” Since more than 90 percent of firm owners reported having no accidents at all, we created four separate outcome variables based on the answers to these questions (separately for owners’ and workers’ answers): whether any accident happened, the number of accidents, whether any injury occurred, and the number of people injured. We also created an accident index following [Kling et al. \(2007\)](#). Additionally, to deal with potential under-reporting of workplace injuries, we also asked the representative worker whether they experienced specific types of injuries in the last three months, including electric shock, burn-related injuries, eye-related injuries, lifting-related injuries, and physical sickness (such as a cold, headache, or back pain). We examine the effects on each of these dummy variables. We also created an injury index based on these five dummy variables.

### 3.4 Main Hypotheses

Our main hypotheses, as specified in the pre-analysis plan,<sup>11</sup> were:

1. Treated firms (in both treatment arms) will have better OHS awareness and adopt better business practices than control firms.
2. As a result of the improvement in OHS awareness and business practices, workers’ perception of their workplace will improve in treated firms.
3. The improvement in business practices and workers’ perception will lead to a range of positive outcomes for the treated firms, including higher worker retention rates and lower turnover rates,<sup>12</sup> reductions in the incidence of accidents and work-related injuries, and improvements in firm productivity and profitability.
4. Firms in the OHS+Biz arm will have better financial linkages (e.g., higher probability of taking a formal loan) and higher levels of investments, which may, in turn, increase productivity

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<sup>11</sup> AEA RCT Registry, ID: AEARCTR-0003386, <https://www.socialscienceregistry.org/trials/3386>.

<sup>12</sup> Past research shows that adverse working conditions are associated with lower worker retention rates and higher quit rates ([Böckerman and Ilmakunnas, 2009](#); [Cottini et al., 2011](#)).



and profitability.

5. Owners and managers in treated firms, particularly those in the OHS+Biz arm, may have more positive attitudes toward their businesses and their lives. These improvements in attitudes could operate through improvements in the work environment and business practices, or they could be the direct effects of receiving business training.<sup>13</sup>

## 4 Data and Empirical Strategy

### 4.1 Baseline Characteristics and Randomization Balance

Table 1 presents the means of firm characteristics at baseline by treatment group. Firm owners were predominantly male (all but six firms had a male owner), with an average age close to 40 and an average of 7 years of formal education. 48 percent of firm owners had completed middle school, and 36 percent used the Internet. The mean (median) firm had been in operation for 12.5 (10) years. Half of them utilized dangerous equipment, and 35 percent had a welding machine. 87 percent of firms had at least one hired worker (other than the owner) present during the baseline interview.

The mean employment size (including the owner) was 3.9, and the median was 3. Around one-third of firms had 5 or more staff; only 3 percent had 10 or more staff; the largest firm had 19 staff. Mean sales revenue in the latest year was 901 thousand takas (approximately 11 thousand USD), with a median of 540 thousand takas, a 10th percentile of 180 thousand, and a 90th percentile of 1.5 million. The mean (median) sales revenue in the latest month was 92 (50) thousand takas. The mean (median) profits in the latest month was 9 (13.5) thousand takas, with 21 percent of firms reporting negative profits in the latest month. The mean (median) value of finished goods inventory was 121 (10) thousand takas, with 45 percent of firms reporting zero finished goods inventory. The mean (median) value of equipment was 440 (250) thousand takas, with the 10th-90th percentile ranging from 60 thousand to 1 million takas.

The random assignment achieved balance on most baseline variables. Column 9 of Table 1 suggests that we can only reject the equality of means across all three arms in 3 out of 33 characteristics (at the 5 percent statistical significance level). Compared to the control group, the OHS group had a slightly higher mean employment size, moderately higher winsorized monthly sales, and a higher rate of membership at a trade organization. Compared to the control group, the OHS+Biz group was less likely to source material inputs beyond the firm’s own district.

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<sup>13</sup>As the business training provided to the OHS+Biz group was centered around management skills (such as marketing and business planning) and financial linkages rather than personal initiatives, we do not expect the business training to have a substantial effect on entrepreneurial attitudes such as business aspirations and proactivity (Campos et al., 2017). However, training providers and the entrepreneurs featured in the training videos may have a role-model effect on training recipients’ attitudes toward business and life (Lafortune et al., 2018; Dalton et al., 2021).

## 4.2 Treatment Compliance, Training Take-up, and Attrition

### Treatment Compliance and Training Take-up

Take-up rates were high and similar across the two treated groups. Among firms assigned to the OHS arm, 489 out of 522 (93.7 percent) attended training. In the OHS+Biz arm, 470 out of 504 (93.3 percent) attended. Additionally, a small fraction of firms in the control group (51 out of 1222, or 4.2 percent) received both OHS and business training even though they were initially assigned neither.<sup>14</sup> Appendix Table A4.1 compares the baseline characteristics of firms that complied with their initial treatment assignment and firms that did not comply. For firms in the control group, compliers and non-compliers have similar baseline characteristics (only 1 of 33 characteristics are significantly different at the 5 percent level). For firms in the OHS and OHS+Biz arm, those who did not attend training were smaller in terms of employment size and had lower sales revenue during the month prior to the baseline survey.<sup>15</sup> However, given that the take-up rate is above 93 percent in both treatment arms, these differences between compliers and non-compliers are trivial in real economic terms. We focus on the intention-to-treat (ITT) effects in our main analysis and present the local average treatment effects (LATE) of receiving training in Appendix 4.

### Attrition

The attrition rate was low as we were able to interview 93.5 percent of the baseline sample in at least one of the two follow-ups. The response rate was 89.5 percent at midline and 86.7 percent at endline; additionally, during the endline survey, we were able to survey some of the firms that attrited at midline. Appendix Table A3.1 describes attrition rates by experimental arm. The attrition rate is balanced across arms at midline; however, at endline, attrition is statistically significantly higher in the control group at 15.3 percent, compared to 10.3 percent in the OHS arm and 11.3 percent in the OHS+Biz arm. Most of the attrition was due to the owner being unavailable, having moved elsewhere, or refusing to continue participation.

Appendix Table A3.2 compares the baseline characteristics of the attritors and non-attritors. At midline, attritors had moderately lower sales revenue than non-attritors and were less likely to be a member of a trade organization. At endline, attritors have slightly smaller employment sizes than non-attritors. We then examine whether attritors' characteristics differ between the experimental arms (Appendix Table A3.3). We find very few characteristics that differ for attritors between the experimental arms.<sup>16</sup> We, therefore, conclude that attrition is unlikely to have undermined the

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<sup>14</sup>This happened for a number of practical reasons. In some cases, firms in the treatment and control groups were very much linked (in terms of business or other linkages), and the owners of the treated firms requested to include these (control) firms in the program.

<sup>15</sup>These differences indicate that the non-compliers may have had higher opportunity costs of attending training, as they had less staff and lower monthly sales shortly before training was scheduled to begin. Appendix 4 describes these differences in detail.

<sup>16</sup>Specifically, at midline, none of the 33 characteristics are significantly different at the 5 percent level between attritors in the control and attritors in the OHS arm; and only 2 out of 33 characteristics are significantly different at the 5 percent level between attritors in the control and those in the OHS+Biz arm (attritors in the OHS+Biz arm were less likely to have employment over 10 and less likely to have a mobile bank account). At endline, 2 out of 33 characteristics are significantly different between attritors in both aforementioned pairs – compared to attritors in the control group, attritors in the OHS arm were more likely to have at least one hired worker present and less

balance across the three arms.

### 4.3 Estimation Equation

Following the registered pre-analysis plan,<sup>17</sup> we estimate the following ANCOVA specification (McKenzie, 2012) to measure the intention-to-treat (ITT) effects of the interventions on each group of outcomes:

$$y_{it} = \alpha + \beta_1 T1_i + \beta_2 T2_i + \gamma y_{i0} + \tau_t + \epsilon_{it} \quad (1)$$

where  $y_{it}$  is the outcome of interest for firm  $i$  at the time  $t$  (the midline or endline survey).  $T1_i$  takes the value one if the firm is randomized into the OHS arm.  $T2_i$  takes the value one if the firm is randomized into the OHS+Biz arm. For outcomes that are measured in the baseline survey, we control for the baseline value of the outcome variable  $y_{i0}$ . This approach has been shown to yield greater statistical power than other estimators when the correlation in the outcome variable over time is low (Frison and Pocock, 1992; McKenzie, 2012), which is typically the case for outcomes such as profits and revenue of small enterprises in developing countries (McKenzie, 2012). In order to maximize statistical power, we also present results using both follow-up rounds pooled together (McKenzie, 2012) and include wave fixed effects,  $\tau_t$ , in all regressions. The coefficients,  $\beta_1$  and  $\beta_2$ , represent the average impact over two years post-treatment. Appendix 7 presents round-by-round estimates for each follow-up wave. We cluster standard errors at the market level to account for the market-level cluster randomization design.

We focus on the ITT effects in our main analysis. The ITT effects measure the causal effects of being offered OHS or OHS+Biz training. Since take-up rates were high in both treatment arms, reliance on the ITT estimates does not result in significantly attenuated estimates of average treatment effects. In Appendix Table A4.2, we present the local average treatment effects (LATE) of receiving training on our primary outcomes by instrumenting training attendance with training assignment in Equation 1. The LATE estimates measure the effects of treatment (being offered training) on the compliers (those who were initially offered training and attended training). However, since the compliance rate was 95.8 percent in the control group, there were very few always-takers, and the treated population consisted almost entirely of compliers. The LATE estimates are, therefore, consistent estimates of the effects of treatment on the treated. We find that the LATE estimates are roughly 12 percent higher than the ITT estimates, with similar levels of statistical significance.

To examine heterogeneous effects, we also examine distributional impacts using quantile regressions. Quantile treatment effects provide insight into how the interventions change the distribution of outcomes, e.g., whether the effects are concentrated on firms in the tails, in the middle, or throughout the distribution. We consider the quantiles at 10, 25, 50, 75, and 90 percent.

Given our multiple outcomes and two treatment arms, it is crucial to correct for multiple hypothesis testing. Our main approach to dealing with multiple hypothesis testing is to aggregate

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likely to have a loan from a formal lender; whereas attriters in the OHS+Biz arm had lower (winsorized) annual sales revenue and were less likely to have a mobile bank account.

<sup>17</sup> AEA RCT Registry, ID: AEARCTR-0003386, <https://www.socialscienceregistry.org/trials/3386>.

outcomes in the same domain into an overall score or an aggregate index. Additionally, in [Appendix 10](#), we also calculate sharpened false discovery rate (FDR) q-values following [Benjamini, Krieger, and Yekutieli \(2006\)](#) as described in [Anderson \(2008\)](#). This method applies the [Benjamini and Hochberg \(1995\)](#) (BH) correction in two stages and provides better power than the standard BH correction method ([Anderson, 2008](#)). We first take the family of main outcomes in [Tables 2, 3, and 4](#) and apply FDR corrections simultaneously for all tests performed in these tables. The estimates are reported in [Appendix Table A10.1](#). Similarly, we also apply FDR corrections simultaneously for all tests performed on secondary outcomes in [Tables 6 and 7](#). The estimates are reported in [Appendix Table A10.2](#).

## 5 Results

### 5.1 Effects on Business Practices

We begin by examining the effects of the interventions on business practices. We focus on the OHS practices and a limited set of management practices targeted by the OHS training program.<sup>18</sup> [Figure 1](#) shows the trajectory of business practices by treatment group. The first panel shows the trajectory of the overall business practices score, which is the average score across all 41 individual practices. The rest of the panels show the scores for each area of practice. The control group exhibited gradual improvements over time in most practices (except for accounting), which may be attributed to the effects of being repeatedly interviewed and probed on these practices.<sup>19</sup> The overall business practices score improved sharply in both treatment arms, with most of the improvements taking place between the baseline and midline and persisting at endline. Among the five practice areas, improvements in the areas of safety and work environment were evident and persistent in both treatment arms; fair labor practices improved in the OHS+Biz group, but not in the OHS group (relative to the control group); material management and accounting practices improved in both treatment arms, however, the improvements were more persistent in the OHS+Biz group than in the OHS group.

[Figure 2](#) compares the distributions of the overall business practices score across the three groups during each survey wave. The Kolmogorov-Smirnov tests of equality of distributions suggest that we cannot reject the equality of distributions at baseline; however, at both midline and endline, the two treated groups are both significantly different from the control group, although not statistically different from each other.

These effects are corroborated in the regression results shown in columns 1 to 6 of [Table 2](#), where we estimate [Equation 1](#) using the practices score in the midline or endline as the outcome variable and including the baseline value of the practices score as a control variable. The overall business practices score improved 5.3 percentage points (pp) in the OHS group and 5.8 pp in the OHS+Biz

<sup>18</sup>We, unfortunately, did not collect data on the additional management practices addressed in the business training program. However, in subsequent sections, we explore the potential impact of the business training program by examining the effects on investment, financial and market linkages, and owners' attitudes toward business and life.

<sup>19</sup>Improvements in the control group's business practices were also reported in other management interventions such as [Iacovone et al. \(2022\)](#) and [Bloom et al. \(2013\)](#).

group, relative to the control group implementing 62 percent of the 41 practices. Both estimates are statistically significant at the 1 percent level. We cannot reject the equality of treatment effects between the two treatment arms, which suggests that the effects were driven by the OHS training and that the business training and access to credit provided in the OHS+Biz arm had no additional impact on improving OHS-related practices.

Among the five practice areas, the estimated effects are statistically significant and similar in magnitude across the two treatment arms in all but one area – fair labor practices. Safety practices improved by 7.7 pp in both treated groups (relative to the control group); work environment practices improved by 2.8 pp in the OHS group and 3 pp in the OHS+Biz group; the effects on fair labor practices were 1.2 pp and statistically insignificant in the OHS group, but 3.2 pp and statistically significant in the OHS+Biz group (the difference between the two treatment effects is statistically significant at the 10 percent level). Material management practices improved by 3.5 pp and 3.6 pp, respectively, in the two treated groups; accounting practices improved by 12.4 pp and 14.1 pp, respectively. These results suggest that OHS information, not credit, is the primary constraint to improving OHS practices in our setting; however, credit or management constraints may be a hurdle to implementing fair labor practices.

Although our OHS intervention departs from traditional business training courses or the typical management interventions studied in the existing literature, it may still be helpful to compare the effects on business practices with the effects found in the literature. The estimated effects of 5.3 to 5.8 pp improvements in business practices are similar to the effects of traditional business training courses on micro and small enterprises found in the literature (McKenzie and Woodruff, 2014), but smaller than the effects of management consulting interventions on larger firms (Bloom et al., 2013; Iacovone et al., 2022).

We also explore the impact on each individual practice within each area (Appendix Table A6.1 presents these results). The improvements in safety and accounting practices were broadbased, whereas the improvements in work environment, fair labor, and material management practices were limited to a few individual practices. The OHS (OHS+Biz) intervention has a positive and statistically significant impact on 9 (9) out of the 15 safety practices and all 3 (3) of the accounting practices, in contrast to only 2 (3) out of the 14 work environment practices, 1 (4) out of the 6 fair labor practices, 1 (1) of the 3 material management practices. The largest magnitude of improvement was in the practice of having a first-aid box (43 to 44 pp improvement relative to the control group mean of 31 percent) and having a fire extinguishing system (21 pp improvement relative to the control group mean of 22.6 percent), followed by having safety signs, having waste disposal bins, and keeping written accounting records of income-expenditure, raw material, and sales (all above 10 pp in magnitudes).

We verify the effects on business practices using the workers’ and enumerators’ assessments of firm practices.<sup>20</sup> These results are presented in Appendix Table A5.1, where we also report the

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<sup>20</sup>During each round of data collection, the enumerators provided their assessment of firm practices for a subset of observable practices. For firms with at least one worker present on the day of the interview, the enumerator also interviewed the most senior worker about business practices and OHS awareness at the firm.

correlation coefficient between the workers’ (or the enumerators’) and the owners’ assessments of each outcome. We first observe that both the workers’ and the enumerators’ assessments are highly correlated with the owners’ assessment. For the overall business practices score, the correlation coefficient is 0.84 between workers’ and owners’ assessments and 0.78 between enumerators’ and owners’ assessments. For the five practice areas, the correlation between workers’ and owners’ assessment is above 0.8 for all but one area – the fair labor practices score, where the correlation coefficient is 0.6. The estimated effects of the OHS and OHS+Biz interventions, as assessed by workers and enumerators, are very similar to those based on the owners’ assessment, with one exception: the effects on fair labor practices are even smaller in magnitude when we use workers’ assessments as outcomes. Enumerators did not provide their assessment of fair labor practices as they are not directly observable. These results suggest that the effects on business practices are verifiable.

Appendix Table A7.1 presents the trajectory of impacts over time during each follow-up survey. The estimated effects are similar in magnitude and statistically indistinguishable between the two follow-up surveys for the overall business practices score and all five practice areas with one exception — the impact of the OHS intervention on material management practices is positive and statistically significant at midline, but zero at endline. These results, together with Figure 1, suggest that the changes in business practices, particularly safety and work environment practices, persisted at least two years after the training program.

We also analyze the distributional impact on business practices using quantile regressions. Panel A of Figure 3 presents quantile treatment effects (at the 10th, 25th, 50th, 75th, and 90th percentiles) on the overall business practices score. We find statistically significant effects of both interventions at all five quantiles considered, suggesting that the interventions were effective in improving practices among all firms, even those at the lower and upper tail of the business practices distribution.

## 5.2 Effects on OHS Awareness and Workers’ Perception of the Work Environment

We then examine the effects of the interventions on owners’ and workers’ knowledge and attitude toward workplace safety and workers’ perception of their workplace. As the relevant survey items were only measured during the follow-up surveys, the regressions presented in this section estimate Equation 1 without controlling for the baseline measure of the outcome variable. The results are presented in columns 7 to 9 of Table 2. The safety knowledge score was 7 pp higher in the OHS group and 6.4 pp higher in the OHS+Biz group, relative to the control group being aware of 83 percent of the 7 safety knowledge items (column 7). The safety discussion score was 3.2 pp higher in the OHS group and 3.9 pp higher in the OHS+Biz group, relative to the control group implementing 90 percent of the 8 safety discussion items.<sup>21</sup>

<sup>21</sup>The results presented in columns 7 and 8 use firm owners’ assessment as the outcome. These effects can be verified using workers’ assessment (presented in columns 7 and 8 of Appendix Table A5.1). For firms with at least one worker present on the day of the interview, the enumerator also asked the most senior worker about safety knowledge and safety discussion at the workplace. For safety knowledge, the correlation between workers’ assessment and owners’ assessment is 0.658; for safety discussion, the correlation is 0.585. The estimated effects of the interventions are very



The improvements in safety knowledge and safe discussion are broad-based – Appendix Table A6.2 presents the effects on each awareness item; the effects are positive and statistically significant on all 15 individual items; the largest impact is on first-aid knowledge and safety protocols (“Safety regulations and work processes are decided in advance in the workplace”), followed by “Safety is frequently discussed in the workplace.” The difference between the effects of the OHS arm and the OHS+Biz arm was small and statistically insignificant for both summary scores and all individual items, suggesting that the effects were driven by the OHS training.

The interventions also improved workers’ perceptions of the work environment. At midline and endline surveys, the most senior workers (if present) were asked to rate improvements in their work environment over the past year on a scale of 0 to 10. The ratings were 0.98 points higher in the OHS group and 1.25 points higher in the OHS+Biz group, relative to the control group average of 4 points. Finally, the effects on OHS awareness and workers’ perception are similar in the two follow-up surveys – we cannot reject the equality of effects across the two follow-ups (columns 7 to 9 of Appendix Table A7.1)

Together, these results suggest the OHS intervention improved safety awareness among firm employees, openness toward feedback and discussion on safety-related issues, and workers’ overall perception of their work environment.

### 5.3 Effects on Firm Employment and Worker Retention

We next examine the effects of the interventions on employment and worker retention. Employment growth is a key marker of firm growth in developing countries (Bruhn et al., 2018; Iacovone et al., 2022). During our conversations with firm owners, they cited difficulties finding and retaining productive workers as a major constraint to firm growth. One of the objectives of the intervention is to improve worker well-being in both pecuniary and non-pecuniary measures. We might, therefore, expect improvements in the work environment to lead to higher worker retention rates and lower turnover rates (Böckerman and Ilmakunnas, 2009; Cottini et al., 2011).

We estimate Equation 1 using employment and worker retention at midline and endline as outcome variables and including the baseline value of the outcome as a control variable. The results are reported in Table 3. We use three measures of firm employment – current employment, average employment last year, and total monthly salary for current staff – and consider both the levels and the log (or IHS) transformed versions of each variable as outcomes (columns 1-6). These six variables were combined to construct an aggregate employment index (column 7).

The OHS intervention had a small positive but statistically insignificant effect on employment (2 to 3 percent), and a sizeable and statistically significant effect on the total monthly salary bill (13.6 percent); the effect on the aggregate employment index is 0.05 standard deviations and statistically insignificant. On the other hand, the OHS+Biz intervention had a moderate effect on employment (4 to 5 percent and statistically significant at the 10 percent level) and a moderate but statistically insignificant effect on the total monthly salary expenditure (8.7 percent); the effect on the aggregate

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similar to those presented in Table 2; the effects on safety knowledge are slightly larger in magnitude when we use workers’ assessment.

employment index is 0.07 standard deviations and statistically significant at the 10 percent level. We use two measures of worker retention – the number and the percentage of workers retained from the previous year (columns 8 and 9, respectively). The effects are small and statistically insignificant for both treatment arms. We cannot reject the equality of treatment effects between the OHS and OHS+Biz arms for any of the employment and worker retention outcomes.<sup>22</sup>

Overall, these results suggest that the OHS intervention had a small and statistically insignificant impact on employment, whereas the OHS+Biz intervention had a moderate and marginally significant impact on employment. Neither intervention had an impact on worker retention.

Panel B of Figure 3 presents the results of quantile regressions using current employment as the outcome variable. It shows that the effects on employment are very heterogeneous across firms. For both interventions, the quantile treatment effects are zero at the 10th, 25th, 50th, and 90th percentile. At the 75th percentile (where current employment is 4), the effect of the OHS+Biz intervention is sizeable (suggesting an increase of 0.5 workers) and statistically significant; the effect of the OHS intervention is also positive, but remains small (0.125) and statistically insignificant. These results suggest that only a small set of moderately-sized firms increased their employment after receiving the OHS+Biz intervention, whereas the majority of firms did not change their employment.

## 5.4 Effect on Firm Performance and Growth

We hypothesized that the improvements in work environment would lead to higher firm productivity and profitability. We also hypothesized that the OHS+Biz intervention would increase firm investments, either as a direct result of receiving business training or as a result of improved access to credit. We present the effects of the interventions on firm performance and growth in Table 4. We examine four measures of firm output and an aggregate output index (columns 1 to 5), one measure of firm investment (the total value of equipment, column 6), and one measure of firm productivity (column 7). The four measures of firm output are: annual sales (sales last year), monthly sales (sales last month), monthly profits (profits over the last month), and finished goods inventory (the value of produced saleable products). We follow Bruhn et al. (2018) and measure total factor productivity as the residual from a regression of log annual sales on log employment and log equipment value (which we call a “productivity residual”).

To deal with noise in survey responses and reduce the influence of outliers, we use three separate forms of each outcome variable: the IHS-transformed variables in *Panel A* of Table 4, the levels in *Panel B*, and the winsorized (at the 1st and the 99th percentile) levels in *Panel C*. The IHS-transformed version is our preferred specification as it approximates the natural logarithm transformation while allowing zero-valued observations (Burbidge et al., 1988; Bellemare and Wichman, 2020). In each panel, the aggregate output index (column 5) is the mean of the stan-

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<sup>22</sup>Appendix Table A7.2 presents the trajectory of impacts over time during each follow-up survey. For all employment and worker retention outcomes, the estimated effects are larger in magnitude during the midline survey than during the endline survey, although we cannot reject the equality of effects over time for all but one outcome variable (average employment last year in levels).



standardized z-scores of the four variables from columns 1 to 4. The productivity residual (column 7) in *Panel A* is the residual of regressing the IHS-transformed annual sales on IHS-transformed current employment and IHS-transformed equipment value; in *Panel B*, it is the residual of regressing  $\log(\text{annual sales} + 1)$  on  $\log$  current employment and  $\log(\text{equipment value} + 1)$ ; in *Panel C*, it is the residual of regressing log winsorized annual sales on log current employment and log winsorized equipment value.

The OHS intervention had positive effects on all four measures of firm output; the effects are statistically significant for annual sales, finished goods inventory, and the aggregate output index, but insignificant for monthly sales and monthly profits. Specifically, the OHS intervention increased annual sales by 13.1 percent (*Panel A*) or 211.8 thousand takas (*Panel B*), increased finished goods inventory by 37.8 percent or 46.8 thousand takas, and increased the aggregate output index by 0.147 standard deviations (from our preferred specification in *Panel A*). Although not statistically significant, the estimated effects on monthly sales are 7 percent or 20.7 thousand takas; and the effects on monthly profits are 5.9 percent or 9.5 thousand takas.<sup>23</sup>

The OHS intervention had null effects on the value of equipment, but increased the productivity residual by 0.096 standard deviations (calculated by dividing the coefficient estimate 0.073 by the control group standard deviation 0.764); the effects on productivity are statistically significant at the 10 percent level. The positive effect on total factor productivity (TFP) is consistent with our finding that the OHS intervention had positive effects on sales, null effects on equipment value, and near-zero effects on log employment (as reported in Table 3). The estimated effects of the OHS intervention are qualitatively similar when we use the levels and winsorized levels as outcome variables (*Panels B* and *C*), which suggests that the effects on output and productivity are not driven by outliers.

The OHS+Biz intervention also had positive effects on firm output, although the effects are only statistically significant for two outcomes – the IHS-transformed annual sales and the aggregate output index. The estimates suggest that the OHS+Biz intervention increased annual sales by 9 percent and the aggregate output index by 0.111 standard deviations. These effects are smaller than the effects of the OHS intervention, although the differences between the two treatment arms are statistically insignificant. Additionally, the estimated effects on annual sales and the output index are no longer statistically significant when we use levels or winsorized levels as outcome variables (*Panels B* and *C*), which suggests a large degree of heterogeneity in the effects of the OHS+Biz intervention.

Overall, we cannot reject the equality of treatment effects between the OHS and OHS+Biz arms on sales, profits, and the output index. Together, these results suggest that the OHS intervention increased firm output and that the business training and access to credit provided in the OHS+Biz arm had no additional impact on firm output, which is consistent with our previous finding that information, not credit, is the primary constraint to improving safety practices in our setting.

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<sup>23</sup>We find statistically significant effects on annual sales (sales in the past year) but not on monthly sales (sales in the latest month). This could be partially due to the higher volatility of monthly sales. We also note that the effects on both annual and monthly sales increased over time (as shown in Table 5 and described later in this section).

However, the OHS+Biz intervention increased firm investment, as measured by equipment value, by 8.4 percent (*Panel A*, statistically significant at the 10 percent level) or 89.8 thousand takas (*Panel B*, statistically significant at the 5 percent level). These estimates are much larger than the effects of the OHS arm, and the differences in effects across the two arms are statistically significant at the 10 percent level when using the IHS and the winsorized levels of equipment value as outcome variables (column 6, *Panels A* and *C*). These results and those in Table 3 suggest that business training and access to credit may have inspired firms in the OHS+Biz arm to invest more in both capital and labor inputs.

Finally, the OHS+Biz intervention had small and statistically insignificant effects on TFP, which is consistent with our finding that the OHS+Biz arm had similar effects on output (i.e., sales) and inputs (i.e., equipment value and log employment).

Table 5 presents the trajectory of impacts on firm performance over time. The estimated effects are generally larger at the second follow-up than at the first. The differences in impacts over time are particularly large for the OHS intervention – the effect on annual sales is 9.7 percent (significant at the 10 percent level) at midline and 16.6 percent (significant at the 1 percent level) at the endline; the effect on monthly sales is 2.5 percent (insignificant) at midline and 11.6 percent (significant) at the endline; the effect on monthly profits is negative and statistically insignificant at midline (-16.7 percent), which plausibly reflects the costs of implementing the safety measures, but positive and statistically significant at the endline (28.9 percent). The differences in the effects on monthly profits across the two follow-ups are statistically significant. Finally, the effect of the OHS training on the TFP is small and statistically insignificant at midline (0.04 standard deviations), but large and statistically significant at the endline (0.17 standard deviations).

These results are consistent with the existing literature on business training, which suggests that the impact on sales and profitability may take time to materialize (McKenzie and Woodruff, 2014; McKenzie, 2021). Several recent RCT studies on business training and management interventions with multiple rounds of follow-ups also find that the impact on sales and profitability is larger two to three years after the intervention than after one year (Higuchi et al., 2017; McKenzie and Puerto, 2021; Anderson and McKenzie, 2022; Bakhtiar et al., 2022).

Again, it may be helpful to compare the magnitude of the effects on sales and profits with the effects found in the existing literature. We found an average impact of 7 to 13 percent on sales and 6 to 9 percent on profits over the course of two years, and an even higher impact at the endline (two years post intervention), which amounts to 8 to 17 percent on sales and 15 to 29 percent on profits. These effects are higher than the estimated effects of traditional classroom-based business training courses on micro and small enterprises (McKenzie, 2021), similar to the effects of more customized business training on micro and small enterprises (McKenzie, 2021), but smaller than the effects of management consulting interventions on larger firms (Bloom et al., 2013; Anderson and McKenzie, 2022; Iacovone et al., 2022).

Together, these results suggest that the OHS intervention improved firms' productivity, sales, and profitability, although these gains took more than one year to be materialized. The OHS+Biz

intervention had no additional impact on firm output but increased firms' investment in capital and labor inputs, which resulted in a net effect of zero on firm productivity.

We present the quantile treatment effects on sales, profits, inventory, and equipment value in Panels C to H of Figure 3. In level terms, the effects on sales increase with quantile for both interventions, showing larger impacts (in level terms) at the top of the sales distribution than at the bottom (Panels C and E). However, when we use the IHS-transformed sales as the outcome variable, the quantile effects are sizeable and similar at all five quantiles considered (Panel D); we cannot reject the equality of effects across the five quantiles, which suggests that in percentage terms the effects are similar across the distribution of sales. Panel F shows that the effects on profits are close to zero at low to median percentiles and becomes larger at the 75th and 90th percentiles, although statistically insignificant at all quantiles. Relatedly, around 13 percent of firms reported negative profits. As other studies of micro and small enterprises have noted, negative or extremely low profits at the low end of the distribution may be partially attributed to firms misclassifying long-term investments as current expenses (Crépon et al., 2015). The effect on finished goods inventory is zero at low to median percentiles (due to 55 percent of firms having zero inventory) and positive at the 75th and 90th percentiles (Panel G). Panel H presents the impact on equipment value; the effects of the OHS+Biz intervention are positive and sizeable at all quantiles and slightly larger on the higher quantiles than the lower quantiles; in contrast, the effects of the OHS intervention are small and statistically insignificant at all quantiles.

## 5.5 Other Outcomes

### Access to Finance and Market Linkage

We hypothesized that the OHS+Biz intervention would improve firms' access to finance and market linkages, as the business training focused on assisting with financial linkages and value chain development. Firms in the OHS+Biz arm were also offered a formal loan at below-market interest rates. Column 1 of Table 6 presents the effects on the financial linkage index. The OHS intervention had no effect on the financial linkage index; the effects of the OHS+Biz intervention were positive but small and statistically insignificant (0.028 standard deviations). Detailed analyses of the six financial linkage items (presented in Appendix Table A6.3) show that neither intervention had any impact on the probability of taking a loan or having a bank account. We note that access to financial services was already relatively high at baseline: more than half already had a loan, 42 percent had a loan from a formal lender, and the majority had either a bank account or a mobile payment account (Table 1).

Column 2 of Table 6 presents the effects on the market linkage index. The market linkage index improved by 0.244 standard deviations in the OHS arm and 0.185 standard deviations in the OHS+Biz arm. Detailed analyses (Appendix Table A6.3) show that treated firms are more likely to source raw materials from multiple districts and be members of trade organizations and business cooperatives. We cannot reject the equality of treatment effects between the two treatment arms for any market linkage items, indicating that the OHS training alone is as effective in expanding

market linkages as the OHS+Biz training. These results suggest that the expansion in market linkages may have resulted from training in groups with other entrepreneurs.

### **Firm Owners’ Attitudes and Management Skills**

We next examine the effects of the interventions on firm owners’ attitudes toward business, attitudes toward life, and self-assessed management skills (columns 3 to 5 of Table 6). Past literature suggests management interventions can have positive impacts on entrepreneurs’ confidence and aspirations (Bruhn et al., 2018; Dalton et al., 2021). Our estimates suggest that both intervention arms had a small, statistically insignificant, albeit positive, impact on the business attitude index (columns 3). However, the OHS+Biz intervention improved the life attitude index by 0.2 standard deviations (statistically significant at the 1 percent level). In contrast, the OHS training alone had a small and statistically insignificant impact on the life attitude index, and the difference in effects across the two treatment arms is statistically significant at the 10 percent level (columns 4). Detailed analyses on the fifteen life attitude items (presented in Appendix Table A6.4) show that the results are driven by improvements in sociability, conscientiousness, and patience.<sup>24</sup> Finally, both treatment arms had positive and statistically significant effects on the management skills index, with similar effects across the two treatment arms (0.21 standard deviations for the OHS arm and 0.16 standard deviations for the OHS+Biz arm). Detailed analyses (presented in Appendix Table A6.4) show that the improvements are broad-based. As the management skills were self-assessed, the estimated effects could be the result of improvements in firm owners’ skills, or they could reflect improvements in firm owners’ self-confidence.

### **Accidents and Injuries**

We hypothesized that better safety measures would reduce the incidence of accidents and work-related injuries. However, if the interventions induced firms to hire new workers and purchase new equipment, we may see an increase in accidents among treated firms. The net effects of the interventions on accidents and injuries are, therefore, theoretically ambiguous. Table 7 presents the estimated effects. We first note that the incidence of accidents is low: 90.4 percent of firm owners in the control group reported zero accidents in their firms in the past year (column 1).<sup>25</sup> The average number of accidents and injuries in the past year was 0.31 and 0.15, respectively (as reported by the firm owners). We find that both the OHS and the OHS+Biz interventions had small and statistically insignificant effects on the number of accidents and injuries, both according to the firm owners’ reports (columns 1 to 5) and according to the representative workers’ reports (columns 6 to 10). We then examine the effects on specific types of injuries reported by the representative worker (columns 11 to 16). Workers reported a high incidence of specific injuries. For instance,

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<sup>24</sup>Specifically, the effects of the OHS+Biz intervention are statistically significant at the 5 percent level on 3 items: can socialize easily, work carefully and accurately, and do everything successfully and efficiently; in addition, the effects are sizeable on the following six items: patient, not harsh toward others, not too introverted, not worried about small things, like to take risks, and strong imagination (Appendix Table A6.4).

<sup>25</sup>A slightly lower percentage (88.1 percent) of representative workers reported zero accidents in their firm in the past year (column 6). However, note that the worker sample differs from the firm owner sample, as 13 percent of firms had no worker present on the day of the survey and did not partake in the workers’ survey.

23.7 percent in the control group reported having had an electric shock in the past three months, 16.7 percent had a lifting-related injury, and 29 percent had some physical sickness (such as a cold, headache, or back pain). However, for all five types of injury, the incidence of injury is very similar between the treated and control firms, as well as between the two treatment arms. Together, these results suggest that neither intervention had any significant impact on the rates of accidents and injuries.

## 5.6 Extensions

### Spillover Effects on Nearby Markets Within Market Cluster

We carried out the randomization at the market level to prevent spillovers within markets. That is, all experimental firms in the same market were either considered as part of a treatment or a control group. In this section, we consider potential spillovers to nearby untreated markets within the same market cluster (MC).<sup>26</sup>

Our baseline sample included 784 MCs (across 79 sub-districts in 20 districts). Although the majority of MCs had only 1 market, many MCs had multiple markets. Specifically, 59.3 percent had only 1 market, 21.3 percent had 2 markets, 9.1 percent had 3 markets, another 5.2 percent had 4 markets, and the rest (5.1 percent of MCs) had 5 to 12 markets. As a result, some MCs had both treated markets and control-group markets, whereas other MCs had only treated markets or only control-group markets. We exploit variations in the proportion of treated firms within each MC to study potential spillover effects from treated firms (in treated markets) to nearby untreated firms (in untreated markets) within the same MC. Appendix Figure A8.1 plots the distribution of control-group firms by the proportion of treated firms in their MC. Around 60 percent of control-group firms were located in MCs with no treated firms (henceforth, control MC); the other 40 percent were in MCs with at least one treated firm (henceforth, treated MC).

As described by Drexler et al. (2014) and McKenzie and Puerto (2021), spillovers may take two forms. One, there may be positive knowledge spillovers if untreated firms located near a treated firm observe and mimic the improved business practices. Two, improvements in the sales revenue of treated firms could come at the expense of nearby untreated firms if treated firms steal business from untreated firms (“business stealing” effects). Alternatively, the revenue of nearby untreated firms could be unaffected if improvements in the sales of treated firms come from an expansion of the market (“market expansion” effects). Additionally, in our context, as most firms employ salaried workers with specialized skills, spillovers may take a third form as firms in the same MC compete for the same set of workers. As work conditions improve in treated firms, workers may demand a higher salary to work for untreated firms if work conditions remain unchanged at untreated firms.

To estimate the extent of within-MC spillovers, we estimate the following three specifications. In the first specification, we modify Equation 1 by adding a dummy that indicates a control-group firm in a treated MC (a treated MC is an MC with at least one treated firm in either the OHS or

<sup>26</sup>These spillover analyses were specified in the registered pre-analysis plan (AEA RCT Registry, ID: AEARCTR-0003386, <https://www.socialscisearch.org/trials/3386>). We referred to market clusters as “areas” in the pre-analysis plan. We use the term “market cluster” instead of “area” in this paper for greater clarity.

the OHS+Biz arm). We estimate the following equation for each firm  $i$  local in MC  $j$  (surveyed in wave  $t = 2$  or  $3$ )

$$y_{ijt} = \alpha + \beta_1 T1_i + \beta_2 T2_i + \beta_3 Control_i \times TreatedMC_j + \gamma y_{i0} + \tau_t + \epsilon_{it} \quad (2)$$

where  $Control_i$  indicates control-group firm and  $TreatedMC_j$  is a dummy equal to one if any firm in MC  $j$  is treated.  $\beta_3$  measures the spillover effects by comparing control-group firms in treated MCs with control-group firms in control MCs. As before, we cluster standard errors at the market level to account for the market-level cluster randomization design.

In the second and third specifications, we explore the variation in treatment intensity across MCs. We ask the following question: conditional on the number of firms in an MC, how does the proportion or number of treated firms within the MC affect the outcomes of untreated firms? If there were strong business stealing effects, then we would expect the sales and profits of untreated firms to decline with the proportion (and the number) of treated firms within the MC. As the second specification, we estimate the following equation

$$y_{ijt} = \alpha + \beta_1 T1_i + \beta_2 T2_i + \beta_3 Control_i \times P1_j + \beta_4 Control_i \times P2_j + \mu N_j + \gamma y_{i0} + \tau_t + \epsilon_{it} \quad (3)$$

where  $P1_j$  is the *proportion* of firms in MC  $j$  that were in the OHS arm,  $P2_j$  the *proportion* of firms in MC  $j$  in the OHS+Biz arm, and  $N_j$  the total number of experimental firms in MC  $j$ .<sup>27</sup> As such,  $\beta_3$  measures the spillover effects of having a higher proportion of OHS-treated firms nearby, and  $\beta_4$  measures the corresponding spillover effects of the OHS+Biz treatment.

As the third specification, we estimate an equation similar to the ones used in [Drexler et al. \(2014\)](#) and [McKenzie and Puerto \(2021\)](#)

$$y_{ijt} = \alpha + \beta_1 T1_i + \beta_2 T2_i + \beta_3 Control_i \times N1_j + \beta_4 Control_i \times N2_j + \mu N_j + \gamma y_{i0} + \tau_t + \epsilon_{it} \quad (4)$$

where  $N1_j$  is the *number* of firms in MC  $j$  that were in the OHS arm, and  $N2_j$  the *number* of firms in MC  $j$  in the OHS+Biz arm.

Table 8 presents the results of estimating Equations 2, 3, and 4, using sales, profits, output, equipment value, and productivity as outcomes. *Panel A* shows the estimated spillover effects on untreated firms in treated MCs. For all seven outcome variables, estimates of the spillover effects ( $\beta_3$  in Equation 2) are positive, small, and statistically insignificant. *Panel B* and *C* show the spillover effects of having more OHS or OHS+Biz-treated firms within MC. Estimates of the spillover effects of OHS-treated firms ( $\beta_3$  in Equations 3 and 4) are positive for all seven outcome variables in both panels and statistically insignificant in all but one case. Estimates of the spillover effects of OHS+Biz-treated firms ( $\beta_4$  in Equations 3 and 4) are statistically insignificant for all seven outcome variables in both panels, although varying in sign across outcomes – positive for monthly sales, monthly profits, and the aggregate output index; negative but small in magnitude

<sup>27</sup>We control for the total number of firms in each MC ( $N_j$ ) to keep our specifications close to those used in [Drexler et al. \(2014\)](#) and [McKenzie and Puerto \(2021\)](#). The results are similar if we remove  $N_j$  from Equations 3 and 4.



for annual sales and productivity. Taken together, these results suggest that we can reject the presence of business stealing effects. In other words, the improvements in sales and output among treated firms did not come at the expense of untreated firms within the same MC.

Evidence of the spillover effects of training programs is mixed in the existing literature. [McKenzie and Puerto \(2021\)](#) studied a business training program for female micro-entrepreneurs and found limited and statistically insignificant spillover effects on untreated firms operating in the same market as treated firms. In contrast, [Drexler et al. \(2014\)](#) studied a financial literacy training program for micro-entrepreneurs and found suggestive evidence of business stealing. However, we note that, in both previous studies, the majority of firms were small shops, such as grocery stores, fruit and vegetable stores, and clothing stores. The demand for their products and services is limited by the size of the local market. In contrast, all firms in our sample are manufacturers in the light engineering (LE) sector. As described in Section 2, demand for LE products in Bangladesh far exceeds domestic supply despite the high growth rate of the LE sector. As a result, compared to previous studies, in our experiment, output growth in treated firms is less likely to affect the demand of their domestic competitors.

[Appendix 8](#) presents the spillover effects on other outcomes, such as business practices, employment, and financial and market linkages. [Appendix Table A8.1](#) shows that the spillover effects on the overall business practices score are positive but negligible in magnitude and statistically insignificant. Among the different practice areas, the spillover effects on fair labor practices are positive and statistically significant. Estimates suggest that untreated firms in treated MCs improved their fair labor practices by 2 percentage points, similar to the improvements in treated firms. [Appendix Table A8.2](#) shows that untreated firms in treated MCs also increased their annual employment by 5.3 percent (significant at the 10 percent level) and their total salary by 14.3 percent (significant at the 5 percent level). These effect sizes are similar to the size of employment and salary increase in treated firms. Moreover, the spillover effects on employment and salary are particularly strong in MCs with higher numbers of OHS+Biz-treated firms. Estimates show that having one additional OHS+Biz-treated firm in an MC increases the employment of untreated firms (within MC) by 2.8 percent and total salary payment by 6.5 percent (both significant at the 5 percent level). Unlike what we previously saw for sales and output, these results on labor outcomes suggest that there may be strong spillover effects operating through the local labor market. Competition for skilled technical workers may have driven untreated firms in treated MCs to adopt better labor practices and pay higher salaries in an effort to retain skilled workers. [Appendix Table A8.3](#) shows that the spillover effects on financial and market linkages, business and life attitudes, and self-assessed management skills are all positive but small in magnitude and statistically insignificant.

## Heterogeneity

In addition to the quantile treatment effects presented in previous sections, we also estimate heterogeneous effects by several baseline firm characteristics: owners' education, owners' age, employment, business practices score, sales, and profits. We extend Equation 1 by adding interaction terms of the treatment variables (OHS and OHS+Biz) with the heterogeneity characteristics (measured at base-

line) and a dummy variable of the characteristics. These results are presented in Appendix Tables [A9.1](#), [A9.2](#), and [A9.3](#). When we examine the effects on firm practices, employment, output, investment, and productivity, we do not find significant heterogeneity along any of the above-mentioned characteristics.

However, we find some heterogeneous effects on firm owners’ business and life attitudes and firms’ market linkages. Specifically, both interventions significantly improved the business and life attitudes of *less* educated firm owners but did not impact the attitudes of more educated owners. We note that more educated firm owners in the control group had more positive attitudes than their less educated counterparts. The training programs effectively closed the gap in attitudes between more and less educated owners. These results suggest that enterprise training programs may be a substitute for formal education in instilling positive attitudes. We also find that both interventions significantly improved the business and life attitudes of older firm owners but had no or small impact on the attitudes of younger owners. Additionally, the effects of the OHS intervention on market linkages are *larger* on firms with higher baseline employment and sales. We describe these results in detail in [Appendix 9](#).

## 6 Conclusion

Despite high economic growth in developing countries, informality remains high, and informal workers have limited social protection. Yet, few studies examine the issue of workplace safety in developing countries, making this work particularly significant. We examine the effectiveness of enterprise training in improving workplace health and safety for informal firms.

We implemented a cluster randomized trial in the light engineering industry in Bangladesh with two treatment arms. Our intervention provides OHS training to firm owners to enhance workplace safety. In the first treatment arm, firm owners received intensive training on occupational health and safety. In the second treatment arm, the firms received the same OHS training, additional business training, and access to financing. Results indicated that the OHS training improved several aspects of firm practices, particularly those related to safety, a decent work environment, and basic accounting. However, we find that the provision of business training and credit access had no additional impact on OHS practices, which suggests that information and knowledge, rather than access to financing, are the main constraints to firms’ investments in workplace safety.

After two years, the interventions significantly improved firm output and sales revenue, and firms in the second treatment arm also experienced moderate increases in employment and equipment value. Additionally, we find that firm owners who received business training also developed better management skills, as well as improvements in sociability, conscientiousness, and patience.

Standard economic theory assumes that OHS practices are costly to the firm and beneficial to the workers. However, our results suggest that promoting OHS may improve productivity and profitability in addition to protecting workers, despite potentially increasing firms’ salary expenditures. In our setting, the cost of the OHS training program is about 6 to 12 percent of the average increase in annual sales. Thus, in low-income settings with poor work conditions and a general lack



of OHS awareness, the benefits of improving OHS practices far exceed the costs of implementing these measures.

The interventions implemented in this project are an example of a general training approach that could be applied in other developing country contexts. Further work remains to be done in other industries and developing countries to help us better understand how best to create safer work environments for millions of workers. A safe work environment has important implications for worker well-being, human capital investments in the labor market, as well as firm productivity.

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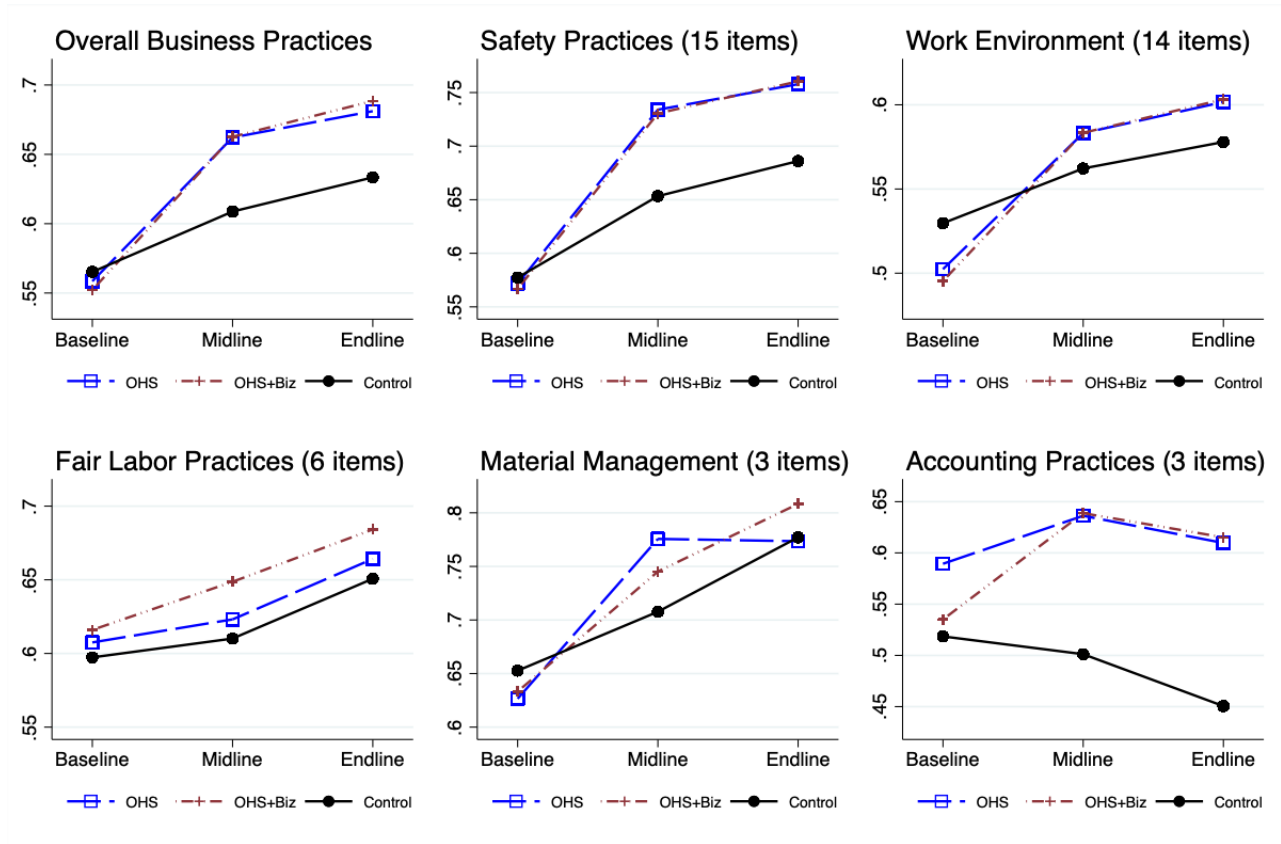
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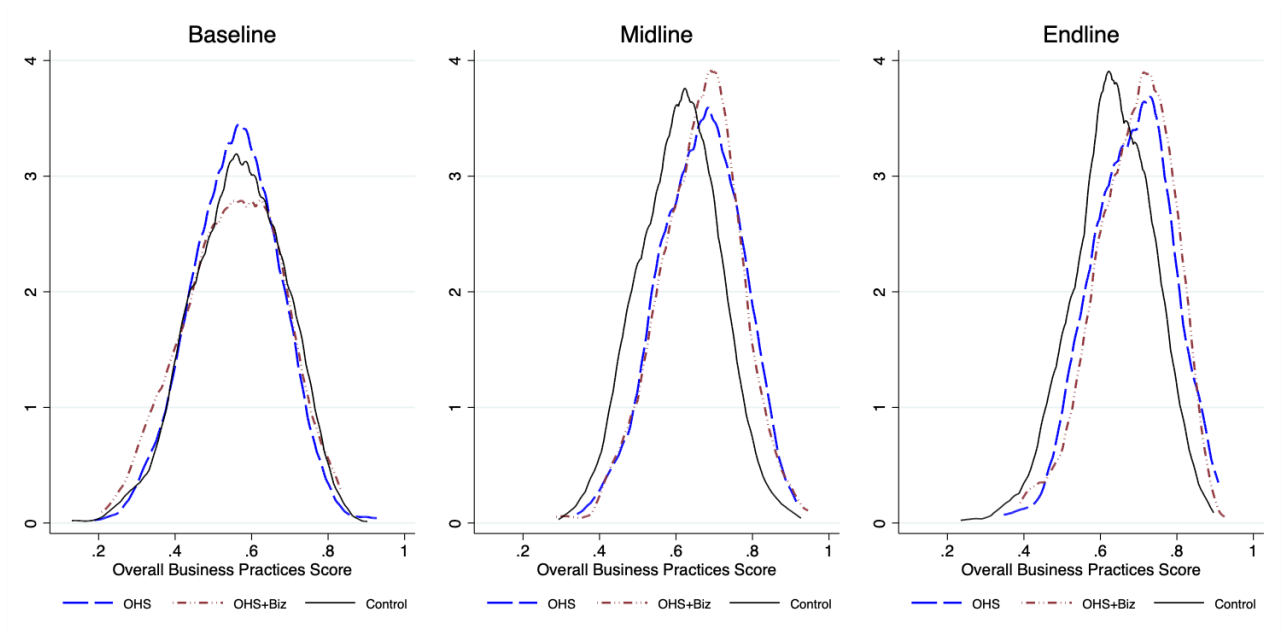
## Figures and Tables

Figure 1: Trajectory of Business Practices by Treatment Group



*Notes:* Means of business practices scores in each survey wave by treatment status. Each score measures the fraction of best practices adopted in an area of OHS or management practices. The overall business practices score measures the fraction of best practices adopted among all 41 practice items. The interventions (OHS or OHS+Biz) were implemented shortly after the baseline survey, approximately one year before the midline survey (December 2018) and two years before the endline survey (December 2019).

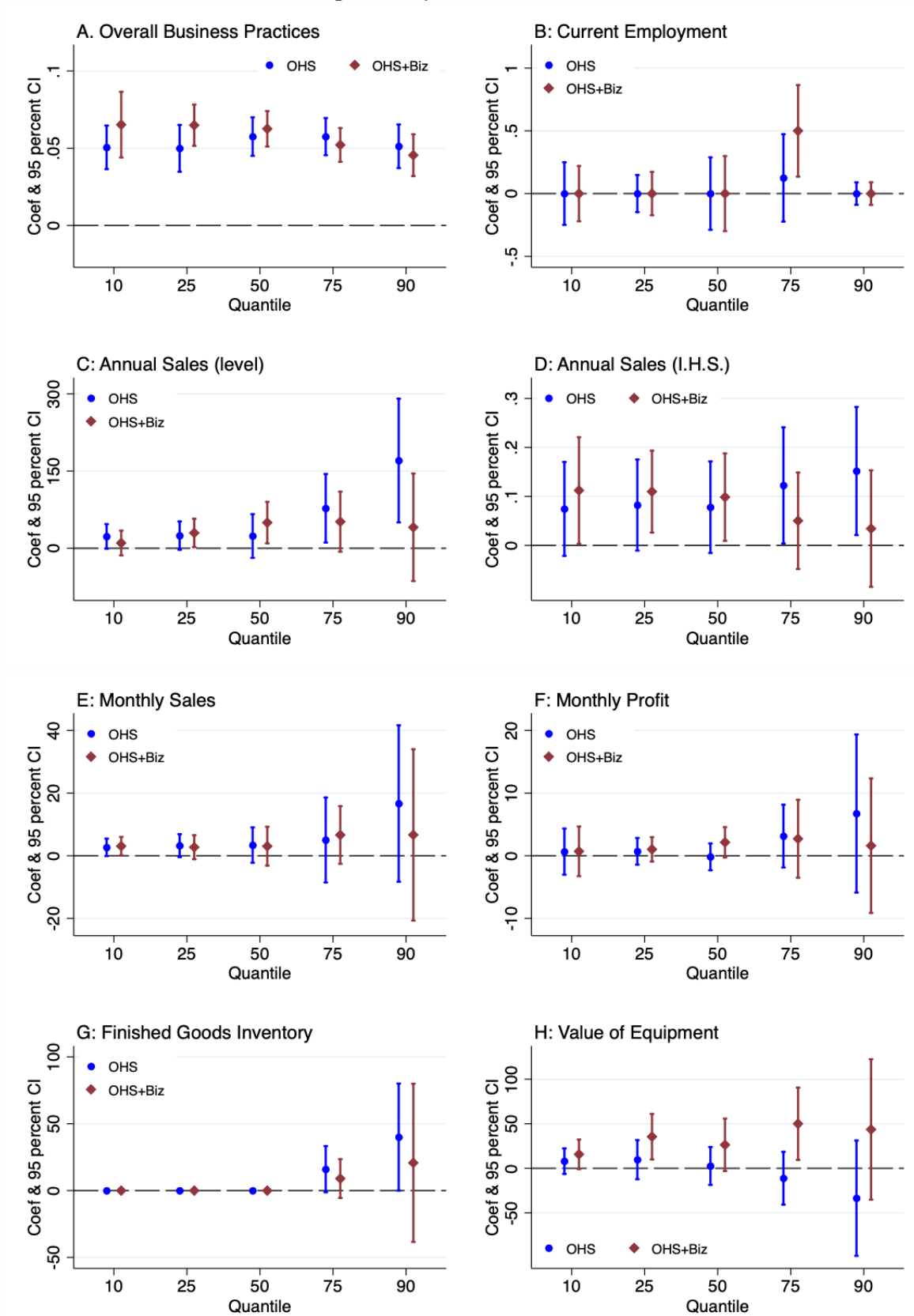
Figure 2: Impact on Distribution of Business Practices Score



*Notes:* Kernel density estimates of the distribution of the overall business practices score at baseline and the two follow-up surveys. The **p-values** of Kolmogorov-Smirnov tests of equality of distributions are: at **baseline 0.116** (OHS vs control), **0.211** (OHS+Biz vs control), and **0.344** (OHS vs OHS+Biz); at **midline 0.000** (OHS vs control), **0.000** (OHS+Biz vs control), and **0.927** (OHS vs OHS+Biz); and at **endline 0.000** (OHS vs control), **0.000** (OHS+Biz vs control), and **0.494** (OHS vs OHS+Biz).



Figure 3: Quantile Treatment Effects



Notes: Coefficient estimates and 95% confidence intervals of quantile regressions. The x-axis shows the quantile for each regression. Standard errors are clustered at the market level, which is the unit of randomization.

Table 1: Baseline Firm Characteristics and Randomization Balance

	(1)	(2)	(3)	(4)	(5)	(7)	(8)	(9)
	Full Sample		Mean by Treatment Arm			P-value for Testing Equality		
	Mean	S.D.	Control	OHS	OHS+Biz	(3)=(4)	(3)=(5)	All 3 Equal
<b><i>Owner Characteristics</i></b>								
Owner is male	0.997	0.052	0.998	0.998	0.996	0.821	0.629	0.831
Owner's age	39.5	10.7	39.5	39.7	39.1	0.730	0.480	0.652
Years of education	6.78	3.45	6.82	6.91	6.55	0.662	0.156	0.247
Completed middle school	0.48	0.50	0.48	0.50	0.47	0.363	0.781	0.552
Uses the Internet	0.36	0.48	0.35	0.37	0.37	0.542	0.593	0.775
<b><i>Firm Characteristics</i></b>								
Firm age	12.5	9.7	12.4	13.0	12.2	0.299	0.723	0.456
Has (hired) worker present	0.87	0.34	0.85	0.88	0.88	0.210	0.137	0.227
Land size	1.83	11.00	2.01	1.68	1.56	0.502	0.338	0.629
Has dangerous equipment	0.50	0.50	0.49	0.52	0.53	0.539	0.341	0.598
Uses welding machine	0.35	0.48	0.35	0.36	0.35	0.877	0.946	0.982
<b><i>Baseline Measures of Outcome Variables</i></b>								
Business practices score	0.56	0.12	0.57	0.56	0.55	0.409	0.204	0.396
Employment (incl. owner)	3.88	2.42	3.76	4.10	3.96	0.016**	0.177	0.040**
Employment $\geq 5$	0.31	0.46	0.29	0.34	0.33	0.055*	0.157	0.104
Employment $\geq 10$	0.03	0.17	0.03	0.04	0.03	0.135	0.644	0.324
Total monthly salary	24	26	23	26	24	0.135	0.650	0.328
Annual sales	901	2500	942	942	757	0.998	0.067*	0.043**
Annual sales winsorized	797	879	792	848	757	0.293	0.488	0.329
Monthly sales	92	229	90	105	84	0.212	0.554	0.199
Monthly sales winsorized	83	114	80	96	78	0.029**	0.796	0.068*
Monthly profits	9.0	125	4.5	13.5	15.1	0.159	0.112	0.187
Monthly profits winsorized	9.3	56	7.8	10.6	11.7	0.387	0.189	0.377
Inventory of finished goods	121	777	106	165	110	0.289	0.873	0.567
Equipment value	440	911	421	458	468	0.454	0.262	0.495
Productivity residual	0.011	0.903	0.037	-0.001	-0.038	0.529	0.169	0.378
Has loan from any source	0.52	0.50	0.52	0.53	0.52	0.736	0.974	0.942
Has loan from formal lender	0.42	0.49	0.41	0.42	0.43	0.721	0.643	0.877
Has bank account	0.66	0.48	0.65	0.65	0.68	0.901	0.255	0.502
Has bKash account	0.41	0.49	0.41	0.43	0.41	0.502	0.944	0.790
Has mobile bank account	0.43	0.50	0.42	0.45	0.42	0.232	0.842	0.413
Source input beyond district	0.11	0.31	0.13	0.10	0.08	0.221	0.009***	0.031**
Sell product beyond district	0.16	0.37	0.16	0.18	0.16	0.378	0.906	0.619
Member of trade org.	0.20	0.40	0.19	0.25	0.18	0.041**	0.645	0.067*
Member of business coop.	0.16	0.37	0.16	0.14	0.19	0.307	0.351	0.253
<b><i>Sample Size</i></b>	2248	.	1222	522	504	.	.	.

*Notes:* Baseline firm characteristics and outcome measures by treatment status. Total monthly salary, sales, profits, inventory, and equipment value are all measured in thousands of takas (1,000 taka was approximately 12 USD during the survey years). Winsorized sales and profits are winsorized at the top and bottom 1%. The p-value for testing equality of means for a variable  $y$  comes from testing  $\beta_1 = \beta_2$ ,  $\beta_1 = \beta_3$ , and  $\beta_1 = \beta_2 = \beta_3$  in regression  $y = \beta_1 \cdot \text{control} + \beta_2 \cdot \text{OHS} + \beta_3 \cdot \text{OHS} + \text{Biz} + \epsilon$  with standard errors clustered at the market level (as the randomization was done at the market level). Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 2: Effects on Business Practices and OHS Awareness

	(1) OHS Practices	(2) Work Environment	(3) Fair Labor Practices	(4) Material Management	(5) Accounting Practices	(6) <b>Overall</b> <b>Business</b> <b>Practices</b> <b>Score</b>	(7) OHS Awareness Knowledge	(8) Safety Discussion	(9) Workers' Rating of Work Envr. (0-10)
OHS [1]	0.077*** (0.007)	0.028*** (0.007)	0.012 (0.010)	0.035** (0.015)	0.124*** (0.023)	0.053*** (0.006)	0.070*** (0.009)	0.032*** (0.008)	0.979*** (0.192)
OHS + Biz [2]	0.077*** (0.006)	0.030*** (0.007)	0.032*** (0.009)	0.036** (0.014)	0.141*** (0.023)	0.058*** (0.005)	0.064*** (0.008)	0.039*** (0.006)	1.247*** (0.169)
P-value: [1] = [2]	0.995	0.831	0.077	0.957	0.540	0.481	0.432	0.384	0.219
Observations	3,963	3,963	3,963	3,963	3,963	3,963	3,963	3,963	3,146
Control group mean	0.669	0.570	0.630	0.742	0.477	0.621	0.828	0.904	4.045
Control group S.D.	0.121	0.136	0.198	0.269	0.477	0.105	0.197	0.171	3.082

*Notes:* Each column is a separate regression pooling midline and endline data. Regressions in cols. 1-6 use the ANCOVA specification – linear regressions of each outcome on its baseline value, indicators of treatment status, and fixed effects for each survey wave. Regressions in cols. 7-9 use simple linear regressions without controlling for baseline values of the outcome variable, as the outcomes in these columns were not measured at baseline. Unit of observation is at the firm-wave level. Sample includes 2,103 unique firms that responded to either the midline or the endline survey (2,013 firms responded to the midline survey and 1,950 to the endline survey). Sample in col. 9 includes only firms with at least one worker present on the day of the survey. Robust standard errors clustered at the market level are shown in parentheses (number of clusters is 1,184 for cols. 1-8 and 1,053 for col. 9). Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 3: Effects on Firm Employment and Worker Retention

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Current		Avg Employment		Total Monthly Salary for		<b>Aggregate</b>	Worker Retention	
	Employment		Last Year		Current Staff (thousands)		<b>Employment</b>	Number	Percent
	Level	Log	Level	Log	Level	IHS	<b>Index</b>	Retained	Retained
OHS [1]	0.058	0.035	0.125	0.021	1.751	0.136**	0.046	0.092	0.012
	(0.077)	(0.023)	(0.128)	(0.024)	(1.081)	(0.063)	(0.035)	(0.093)	(0.018)
OHS + Biz [2]	0.148*	0.042*	0.265**	0.050*	2.044*	0.087	0.074*	0.034	0.002
	(0.085)	(0.024)	(0.124)	(0.026)	(1.058)	(0.066)	(0.038)	(0.089)	(0.017)
P-value: [1] = [2]	0.369	0.788	0.277	0.331	0.823	0.526	0.527	0.603	0.643
Observations	3,963	3,963	3,963	3,963	3,963	3,963	3,963	3,201	3,201
Control group mean	3.361	1.006	3.360	1.006	22.52	2.915	0	1.961	0.570
Control group S.D.	2.228	0.657	2.221	0.656	25.75	1.698	1	1.909	0.385

*Notes:* **Employment** is measured as the number of workers plus the workshop owner. **Total monthly salary for current staff** is the total monthly salary payment made to workers (not including the workshop owner's payment to him/herself) measured in thousands of takas. **IHS** refers to the inverse hyperbolic sine transformation. **Aggregate employment index** is the mean of the standardized z-scores of the six employment and salary measures from cols. 1-6. **Worker retention** refers to the number (col. 8) or percent (col. 9) of workers from the previous year retained at the time of each survey.

Each column is a separate regression pooling midline and endline data and using the ANCOVA specification. Unit of observation is at the firm-wave level. Sample in cols. 1-7 includes 2,103 unique firms that responded to either the midline or the endline survey (2,013 firms responded to the midline survey and 1,950 to the endline survey). Sample in cols. 8-9 is restricted to firms with at least one hired worker in the baseline survey. Robust standard errors clustered at the market level are shown in parentheses (number of clusters is 1,184 for cols. 1-7 and 1,046 for cols. 8-9). Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 4: Effects on Firm Performance and Growth (Pooling Both Follow-ups)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Annual Sales	Monthly Sales	Monthly Profits	Finished Goods Inventory	<b>Aggregate Output Index</b>	Value of Equipment	Productivity Residual
<i>Panel A: Outcomes measured in Inverse Hyperbolic Sine (IHS)</i>							
OHS [1]	0.131*** (0.050)	0.070 (0.049)	0.059 (0.113)	0.378*** (0.124)	0.147*** (0.054)	-0.005 (0.044)	0.073* (0.041)
OHS + Biz [2]	0.090** (0.044)	0.080* (0.046)	0.089 (0.122)	0.180 (0.126)	0.111** (0.050)	0.084* (0.046)	0.016 (0.035)
P-value: [1] = [2]	0.481	0.860	0.828	0.167	0.560	0.094	0.212
Control group mean	6.814	4.771	2.841	2.020	0	6.211	-0.025
Control group S.D.	0.920	1.018	2.622	2.538	1	1.058	0.764
<i>Panel B: Outcomes measured in Levels (thousands of takas)</i>							
OHS [1]	221.8*** (84.0)	20.7* (10.7)	9.5* (5.8)	46.8** (18.7)	0.225*** (0.084)	47.6 (50.4)	0.073* (0.040)
OHS + Biz [2]	76.0 (50.5)	5.9 (9.2)	2.3 (4.1)	23.3 (17.2)	0.073 (0.056)	89.8** (37.1)	0.017 (0.035)
P-value: [1] = [2]	0.104	0.251	0.238	0.333	0.101	0.458	0.213
Control group mean	726.5	104.1	29.52	67.52	0	429.7	-0.027
Control group S.D.	1024	159.4	95.25	222.8	1	623.1	0.764
<i>Panel C: Outcomes measured in Winsorized Levels (thousands of takas)</i>							
OHS [1]	105.9** (43.7)	6.4 (7.1)	3.0 (3.0)	21.1** (8.7)	0.101* (0.054)	0.1 (21.0)	0.065* (0.038)
OHS + Biz [2]	50.4 (35.0)	1.6 (5.6)	1.7 (2.8)	2.9 (7.3)	0.030 (0.043)	47.2** (23.7)	0.023 (0.033)
P-value: [1] = [2]	0.255	0.540	0.715	0.062	0.230	0.072	0.316
Control group mean	709.1	100.7	30.02	61.92	0	411.4	3,963
Control group S.D.	893.3	132.1	60.27	163.1	1	482.3	0.746

*Notes:* Number of observations equals 3,963 in all regressions. Sales, profits, inventory, and equipment value are all measured in thousands of takas (1,000 taka was approximately 12 USD during the survey years). In each panel, the **aggregate output index** (col. 5) is the mean of the standardized z-scores of the four variables from cols. 1-4. The **productivity residual** (col. 7) in Panel A is the residual of regressing the IHS-transformed annual sales on IHS-transformed current employment and IHS-transformed equipment value; in Panel B, it is the residual of regressing  $\log(\text{annual sales} + 1)$  on  $\log$  current employment and  $\log(\text{equipment value} + 1)$ ; in Panel C, it is the residual of regressing  $\log$  winsorized annual sales on  $\log$  current employment and  $\log$  winsorized equipment value. Each column in each panel is a separate regression pooling midline and endline data and using the ANCOVA specification. Unit of observation is at the firm-wave level. Sample includes 2,103 unique firms that responded to either the midline or the endline survey (2,013 firms responded to the midline survey and 1,950 to the endline survey). Robust standard errors clustered at the market level are shown in parentheses (number of clusters is 1,184). Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 5: Effects on Firm Performance and Growth During Each Follow-up

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Annual Sales	Monthly Sales	Monthly Profits	Finished Goods Inventory	<b>Aggregate Output Index</b>	Value of Equipment	Productivity Residual
<i>Panel A: Effects During the First Follow-up (Midline)</i>							
OHS [1]	0.097* (0.056)	0.025 (0.059)	-0.167 (0.162)	0.415*** (0.158)	0.094 (0.059)	-0.039 (0.051)	0.029 (0.050)
OHS + Biz [2]	0.090* (0.050)	0.087 (0.056)	0.034 (0.189)	0.248 (0.159)	0.117* (0.060)	0.075 (0.053)	0.007 (0.047)
P-value: [1] = [2]	0.910	0.371	0.342	0.364	0.735	0.066	0.703
Observations	2,013	2,013	2,013	2,013	2,013	2,013	2,013
Control group mean	6.524	4.781	2.647	2.237	0	6.225	-0.310
Control group S.D.	0.830	1.045	2.780	2.597	1	1.064	0.719
<i>Panel B: Effects During the Second Follow-up (Endline)</i>							
OHS [3]	0.166*** (0.061)	0.116** (0.055)	0.289** (0.140)	0.339** (0.144)	0.201*** (0.065)	0.030 (0.048)	0.119** (0.050)
OHS + Biz [4]	0.090* (0.054)	0.075 (0.054)	0.146 (0.143)	0.110 (0.146)	0.106* (0.061)	0.095* (0.055)	0.026 (0.044)
P-value: [3] = [4]	0.287	0.521	0.381	0.169	0.212	0.287	0.108
Observations	1,950	1,950	1,950	1,950	1,950	1,950	1,950
Control group mean	7.119	4.761	3.045	1.792	0	6.197	0.274
Control group S.D.	0.912	0.989	2.428	2.455	1	1.052	0.691
P-value: [1] = [3]	0.244	0.105	0.024	0.662	0.076	0.111	0.127
P-value: [2] = [4]	0.994	0.844	0.625	0.426	0.880	0.724	0.739

*Notes:* All outcomes are measured in Inverse Hyperbolic Sine (IHS). Sales, profits, inventory, and equipment value are all measured in thousands of takas (1,000 taka was approximately 12 USD during the survey years). The productivity residual (col. 7) is the residual of regressing the IHS-transformed annual sales on IHS-transformed current employment and IHS-transformed equipment value. Each column in each panel is a separate regression using the ANCOVA specification. Unit of observation is at the firm-wave level. Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 6: Effects on Access to Finance, Market Linkage, and Owner's Attitudes and Skills

	(1)	(2)	(3)	(4)	(5)
	Financial Linkage Index	Market Linkage Index	Business Attitude Index	Life Attitude Index	Management Skills Index (self-assessed)
OHS [1]	-0.001 (0.041)	0.244*** (0.052)	0.065 (0.062)	0.076 (0.063)	0.210*** (0.046)
OHS + Biz [2]	0.028 (0.044)	0.185*** (0.056)	0.086 (0.053)	0.203*** (0.062)	0.163*** (0.049)
P-value: [1] = [2]	0.580	0.338	0.772	0.075	0.365
Observations	3,963	3,963	3,963	1,950	3,963

*Notes:* All indices are standardized so that the control group would have mean zero and standard deviation equal to one. Each column is a separate regression pooling midline and endline data. Regressions in cols. 1-2 use the ANCOVA specification. Regressions in cols. 3-5 use simple linear regressions without controlling for baseline values of the outcome variable, as the outcomes in these columns were not measured at baseline. Unit of observation is at the firm-wave level. Sample in col. 4 includes only endline observations as questions regarding life attitude were only asked at endline. Robust standard errors clustered at the market level are shown in parentheses (number of clusters is 1,184 in cols. 1-3 and 5, and 1,124 in col. 4). Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .



Table 7: Effects on Accidents and Injuries

	(1)	(2)	(3)	(4)	(5)
<i>Outcome Variable</i>	Owner's answers to "accidents and resulting injuries in workshop last year"				
	Any Accident	Number of Accidents	Any Injuries	Number of Injuries	<b>Accident Index I</b>
OHS [1]	0.003 (0.016)	0.014 (0.104)	0.006 (0.016)	0.022 (0.030)	0.024 (0.055)
OHS + Biz [2]	0.013 (0.017)	0.094 (0.129)	0.013 (0.017)	0.046 (0.037)	0.058 (0.065)
P-value: [1] = [2]	0.633	0.566	0.756	0.561	0.650
Observations	3,963	3,963	3,963	3,963	3,963
Control group mean	0.096	0.309	0.090	0.150	0
Control group S.D.	0.295	1.767	0.287	0.568	1

	(6)	(7)	(8)	(9)	(10)
<i>Outcome Variable</i>	Worker's answers to "accidents and resulting injuries in workshop last year"				
	Any Accident	Number of Accidents	Any Injuries	Number of Injuries	<b>Accident Index II</b>
OHS [1]	0.006 (0.016)	0.037 (0.112)	0.008 (0.016)	0.026 (0.034)	0.025 (0.054)
OHS + Biz [2]	0.024 (0.020)	0.163 (0.145)	0.020 (0.020)	0.052 (0.043)	0.085 (0.068)
P-value: [1] = [2]	0.409	0.447	0.582	0.585	0.432
Observations	3,146	3,146	3,138	3,138	3,146
Control group mean	0.119	0.349	0.115	0.190	0
Control group S.D.	0.323	1.759	0.319	0.612	1

	(11)	(12)	(13)	(14)	(15)	(16)
<i>Outcome Variable</i>	Worker's answers to "In last 3 months, have you had ..."					
	Electric Shock Injuries	Burn-related Injuries	Eye-related Injuries	Lifting-related Injuries	Physical Sickness (e.g. cold)	<b>Worker Injury Index</b>
OHS [1]	-0.005 (0.021)	-0.014 (0.016)	0.012 (0.015)	0.016 (0.020)	0.011 (0.026)	0.015 (0.056)
OHS + Biz [2]	-0.005 (0.020)	-0.005 (0.017)	0.015 (0.016)	-0.018 (0.019)	-0.024 (0.021)	-0.026 (0.052)
P-value: [1] = [2]	1.000	0.617	0.879	0.122	0.216	0.521
Observations	3,146	3,146	3,146	3,146	3,146	3,146
Control group mean	0.237	0.119	0.105	0.167	0.290	0
Control group S.D.	0.426	0.323	0.306	0.373	0.454	1

*Notes:* **Accident index I** (col. 5) is the mean of the standardized z-scores of cols. 1-4. **Accident index II** (col. 10) is the mean of the standardized z-scores of cols. 6-9. **Worker injury index** (col. 16) is the mean of the standardized z-scores of cols. 11-15. Each column is a separate simple linear regression pooling midline and endline data use (without controlling for baseline values of the outcome variable as the outcomes were not measured at baseline). Unit of observation is at the firm-wave level. Sample in cols. 1-5 includes 2,103 unique firms that responded to either the midline or the endline survey (2,013 firms responded to the midline survey and 1,950 to the endline survey). Sample in cols. 6-16 is restricted to firms with at least one hired worker in the baseline survey. Robust standard errors clustered at the market level are shown in parentheses (number of clusters is 1,184 in cols. 1-5, and 1,053 in cols. 6-16). Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 8: Within-MC Spillover Effects on Firm Performance and Growth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Annual Sales	Monthly Sales	Monthly Profits	Finished Goods Inventory	<b>Aggregate Output Index</b>	Value of Equipment	Productivity Residual
<i>Panel A:</i> Specification 1 - <b>A dummy</b> indicating control-group firms in treated MC							
OHS	0.149*** (0.055)	0.084 (0.053)	0.083 (0.131)	0.456*** (0.133)	0.172*** (0.059)	0.026 (0.049)	0.089** (0.044)
OHS + Biz	0.109** (0.048)	0.094* (0.050)	0.113 (0.139)	0.258* (0.134)	0.137** (0.055)	0.116** (0.051)	0.032 (0.039)
Control firm in treated MC	0.046 (0.045)	0.033 (0.051)	0.060 (0.133)	0.191 (0.144)	0.063 (0.057)	0.076 (0.049)	0.038 (0.038)
<i>Panel B:</i> Specification 2 - Control-group firm $\times$ <b>Percentage</b> of OHS or OHS+Biz treated firms in MC							
OHS	0.141*** (0.051)	0.089* (0.053)	0.107 (0.128)	0.439*** (0.138)	0.172*** (0.058)	0.019 (0.049)	0.078* (0.040)
OHS + Biz	0.092** (0.046)	0.099** (0.049)	0.127 (0.133)	0.227* (0.134)	0.127** (0.053)	0.109** (0.050)	0.012 (0.037)
Control $\times$ % OHS-treated	0.090 (0.123)	0.090 (0.134)	0.304 (0.387)	0.489 (0.367)	0.159 (0.149)	0.088 (0.138)	0.104 (0.101)
Control $\times$ % OHS+Biz-treated	-0.026 (0.144)	0.145 (0.171)	0.217 (0.412)	0.143 (0.404)	0.086 (0.177)	0.219 (0.148)	-0.135 (0.117)
N. firms in MC	-0.008** (0.004)	-0.000 (0.004)	-0.010 (0.010)	-0.014 (0.011)	-0.008* (0.004)	0.001 (0.003)	-0.009*** (0.003)
<i>Panel C:</i> Specification 3 - Control-group firm $\times$ <b>Number</b> of OHS or OHS+Biz treated firms in MC							
OHS	0.135*** (0.050)	0.087* (0.051)	0.134 (0.124)	0.402*** (0.136)	0.169*** (0.056)	0.018 (0.047)	0.072* (0.039)
OHS + Biz	0.086* (0.045)	0.096** (0.047)	0.148 (0.129)	0.189 (0.131)	0.123** (0.051)	0.106** (0.048)	0.006 (0.036)
Control $\times$ N. OHS-treated	0.000 (0.012)	0.009 (0.015)	0.038 (0.027)	0.039 (0.038)	0.016 (0.013)	0.020** (0.009)	0.001 (0.011)
Control $\times$ N. OHS+Biz-treated	-0.000 (0.025)	0.018 (0.029)	0.077 (0.062)	-0.022 (0.063)	0.011 (0.033)	0.016 (0.023)	-0.012 (0.019)
N. firms in MC	-0.008* (0.005)	-0.001 (0.004)	-0.015 (0.012)	-0.014 (0.011)	-0.009** (0.005)	-0.001 (0.004)	-0.008** (0.004)
Observations	3,963	3,963	3,963	3,963	3,963	3,963	3,963

*Notes:* All Outcomes measured in Inverse Hyperbolic Sine (IHS). Sales, profits, inventory, and equipment value are all measured in thousands of takas (1,000 taka was approximately 12 USD during the survey years). Each column in each panel is a separate regression using the ANCOVA specification. “% OHS-treated” refers to the percentage of firms within the market cluster (MC) that were in the OHS arm. “N. OHS-treated” refers to the number of firms within the MC that were in the OHS arm. “N. firms in MC” refers to the total number of experimental firms in the MC. Unit of observation is at the firm-wave level. Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

# Appendix

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## Appendix 1 Timeline

August 2017	The randomization was conducted on a computer.
September 2017	The baseline survey was conducted.
October-December 2017	The interventions were implemented.
December 2018	The first follow-up (midline) survey was conducted.
December 2019	The second follow-up (endline) survey was conducted.

## Appendix 2 Measurement of Key Outcomes

### Appendix 2.1 Business Practices

A total of 41 individual practices were measured, including 35 OHS practices and 6 management practices. These items were measured in all three survey waves, and answers were sought from both the owner and the most senior worker (if available). Direct observations from the enumerator are also recorded unless otherwise noted. Items are coded as 1= yes, 0 = no unless otherwise noted.

- **Safety practices** (15 items, covering electrical connection, machinery, and safety-related tools) (Items 2, 3, and 5 were *not* answered by the enumerator.)

1. Electricity connection is safe.
2. Does any shortcircuit take place due to the electric connection? (1= no, 0 = yes).
3. How frequently is electric connection being checked? (4 = daily, 3 = weekly, 2 = monthly, 1 = less than once a month).
4. Electrical wiring system is safe.
5. Is the electrical wiring system tested?
6. Earthing system is in place.
7. First aid box is available in the workshop
8. Machines are functional and properly maintained.
9. Do you ensure safe operation of machinery?
10. Is there a machine safeguard?
11. Does the workshop have a fire extinguishing system?
12. Are there safety signs in the workshop?
13. Workers have and use safety instrument.
14. Workshop has an emergency stop switch.
15. Overall safety inspection and maintenance take place at least once a year.

- **Work environment practices** (14 items, covering workspace cleanliness, light and air flow, and drinking water and sanitation)
  1. Overall cleanliness of the workplace (4 = very clean, 3 = clean, 2 = dirty, 1=very dirty).
  2. Workshop uses a bin for waste disposal.
  3. How frequently is workshop cleaned (mopped or swept)? (4 = daily, 3 = weekly, 2 = monthly, 1 = less than once a month).
  4. There is sufficient light and air flow at the workshop.
  5. Workshop has windows & windows enable sufficient flow of light and air.
  6. Workshop has shutters & shutters enable sufficient flow of light and air.
  7. Workshop has sufficient fans and light bulbs for required amount of light and air flow.
  8. Is there enough space available to work in the workshop?
  9. Filtered water is provided at workshop for drinking.
  10. Workshop has a drainage system.
  11. Workshop has toilets nearby.
  12. Workshop has both male and female toilets nearby.
  13. Workshop has at least one toilet on site.
  14. The toilets are cleaned regularly.
- **Fair labor practices** (6 items, covering timely pay and rest days) (These items were *not* answered by the enumerator.)
  1. Appointment letters are issued when staff are recruited.
  2. Workshop gives staff festival bonus every year.
  3. Workshop gives staff weekly off day(s).
  4. Workshop gives staff sick leave.
  5. Workshop gives staff paternity/maternity leave.
  6. Workshop pays staff salary in a timely fashion.
- **Material management practices** (3 items, covering the storage and management of materials)
  1. Workshop has scrap management in place.
  2. Workshop follows a store management system for raw materials.
  3. Raw materials are managed and kept in an orderly manner.
- **Accounting practices** (3 items, covering the maintenance of records for income, expenditure, raw material, and sales)

1. Income-expenditure account is maintained using pen-paper or computer.
2. Raw material account is maintained using pen-paper or computer.
3. Sales account is maintained using pen-paper or computer.

## Appendix 2.2 OHS Awareness

The following 15 OHS awareness questions were used to measure safety knowledge and awareness at the workplace and the safety discussion and feedback process within the firm. These questions were only asked in the two follow-up surveys (not in the baseline survey). They were answered by both the owner/manager and the most senior worker (if available). Enumerators' observations are not available (and not applicable) for these questions. All items are coded as 1 = agree, 0.5 = partly agree, 0 = disagree.

- **Safety knowledge** (7 items, covering staff's knowledge and awareness of safety measures)
  1. In the workplace, everyone knows the required information to work safely.
  2. In the workplace, everyone has the required first-aid knowledge during emergency.
  3. Also, everyone has the required first-aid knowledge during non-emergency.
  4. Co-workers cooperate and reinforce each other about safety precautions.
  5. While providing training, safety is considered of grave importance.
  6. Safety regulations and work processes are decided in advance in the workplace.
  7. I am quite aware of the necessity of following safety rules.
- **Safety discussion** (8 items, covering the discussion and feedback process regarding safety measures)
  1. Both authority and staff work together to ensure safety.
  2. Workshop authority responds quickly whenever any safety issue rises.
  3. Authority solicits staff inputs regarding safety.
  4. Workers are informed if they do not abide by safety rules.
  5. Safety is frequently discussed in the workplace.
  6. Workers are often asked about safety issues and concerns.
  7. Workers are welcome to express safety concerns/issues.
  8. Workers are aware of rights and responsibilities related to safety.

## Appendix 2.3 Other Outcomes

- The **financial linkage index** summarizes the following 5 items (all items are coded as 1 = yes, 0 = no):
  1. Do you or your spouse have any loan?

2. (If yes to #1) Are any of the loans from a formal lending institution?
  3. Does your workshop have any bank accounts?
  4. Do you have any bKash accounts?
  5. Do you have any mobile bank accounts?
- The **market linkage index** summarizes the following 4 items (all items are coded as 1 = yes, 0 = no):
    1. Does workshop source raw materials from more than one district?
    2. Does workshop sell products beyond local district?
    3. Are you a member of any trade organization (e.g., Bangladesh Engineering Industry Owners Association)?
    4. Are you a member of any business related cooperative society?
  - The **business attitude index** summarizes the following 8 items (unless otherwise noted as reverse coded, items are coded as 1 = completely disagree, 2= partially disagree, 3 = neither agree nor disagree, 4 = partially agree, 5 = completely agree):
    1. Though my business is going as expected, I am always looking for ways to improve my business. [“always improving”]
    2. When I fail to meet customer demand for delivery time or serving the order, I just let them wait without addressing their concern. (*reverse coded*) [“care about my clients”]
    3. I do not take any initiative without being 100% sure of its success. (*reverse coded*) [“take risks”]
    4. I do not think about the future of my business. I rather work in the present. For example, I plan for business on a weekly basis. (*reverse coded*) [“make long-term plans”]
    5. I take decision to do things on my own and do it instantly without discussing with others. (*reverse coded*) [“no hasty decisions”]
    6. I am usually able to make people understand my point of view or opinion even if they initially disagree. [“try to make others understand my view”]
    7. I am constantly meeting new people and networking because every such contact could come into assistance in the future. [“always making new connections”]
    8. I just follow the traditional pattern of doing business as others do – manufacturing and selling products. So, I do not think of introducing new ideas for business development. (*reverse coded*) [“seek continuous business improvement”]
  - The **life attitude index** summarizes the following 15 items (unless otherwise noted as reverse coded, items are coded as 1 = completely disagree, 2= partially disagree, 3 = neither agree nor disagree, 4 = partially agree, 5 = completely agree):



1. You can easily have a chat with anyone. ["can socialize easily"]
  2. You do any work very carefully and accurately.
  3. You often think of new ideas. ["good at finding new ideas"]
  4. You are a very quiet person. (*reverse coded*) ["not too introverted"]
  5. You are slow-paced in nature. You can easily deal with any problem or stress. ["can handle pressure"]
  6. You easily forgive others. ["forgiving"]
  7. You worry a lot about minor things. (*reverse coded*) ["not worried about small things"]
  8. Your imagination is very keen. ["strong imagination"]
  9. You are somewhat lazy in nature. (*reverse coded*) ["not lazy"]
  10. You are kind and tolerant towards others.
  11. You do everything successfully and efficiently.
  12. You sometimes treat others very harshly or badly. (*reverse coded*) ["not harsh towards others"]
  13. You are not that patient. (*reverse coded*) ["patient"]
  14. You like to take risks in any job.
  15. When faced with a difficult problem, you usually find a way to solve it. ["can solve difficulties"]
- The **management skills index** summarizes the following 8 items (all items are coded 1 to 5 with "1 = quite unskilled" and "5 = highly skilled"):
1. Accounting skill to keep account of your money/transactions
  2. Communication skill or interpersonal skill to exchange thoughts
  3. Financial literacy to manage income-expense, profit-loss, savings-loan
  4. Social skill / being sociable / reciprocity
  5. Empathy / compassion towards others / understanding own and others' emotions
  6. Leadership skill
  7. Organizing skill
  8. Working in team

## Appendix 3 Survey Response Rates and Attrition

Table A3.1: Attrition Rates by Survey Round and Treatment Status

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
					P-value for Testing Equality		
	Overall Sample	Control Group	OHS Arm	OHS+Biz Arm	Control = OHS	Control = OHS+Biz	All 3 Equal
<i>Attrition rate by survey wave</i>							
Attrition rate at midline	0.105	0.110	0.098	0.099	0.433	0.531	0.681
Attrition rate at endline	0.133	0.153	0.103	0.113	0.003	0.021	0.005
Percent never followed up	0.065	0.069	0.054	0.066	0.239	0.800	0.496
<i>Number of firms surveyed by survey wave</i>							
Baseline	2248	1222	522	504			
Midline	2013	1088	471	454			
Endline	1950	1035	468	447			
At least one follow-up	2103	1138	494	471			

*Notes:* Attrition rate and number of firms surveyed by survey wave and treatment status. Attrition rate at midline and endline are calculated in comparison to the baseline. The p-value for testing equality of means for a variable  $y$  come from testing  $\beta_1 = \beta_2$ ,  $\beta_1 = \beta_3$ , and  $\beta_1 = \beta_2 = \beta_3$  in regression  $y = \beta_1 \cdot \text{control} + \beta_2 \cdot \text{OHS} + \beta_3 \cdot \text{OHS\_Biz} + \epsilon$  with standard errors clustered at the market level (as the randomization is done at the market level).

Table A3.2: Baseline Characteristics by Attrition Status

	(1) Attritted in Midline	(2) Observed in Midline	(3) P-value (1) = (2)	(4) Attritted in Endline	(5) Observed in Endline	(6) P-value (4) = (5)
<b><i>Owner Characteristics</i></b>						
Owner is male	1.000	0.997	0.014**	1.000	0.997	0.014**
Owner's age	39.0	39.5	0.552	39.2	39.5	0.679
Years of education	6.68	6.79	0.605	6.89	6.76	0.564
Completed middle school	0.46	0.48	0.399	0.49	0.48	0.808
Uses the Internet	0.39	0.36	0.402	0.38	0.36	0.492
<b><i>Firm Characteristics</i></b>						
Firm age	13.0	12.5	0.495	12.3	12.6	0.622
Has (hired) worker present	0.86	0.87	0.772	0.84	0.87	0.239
Land size	1.88	1.83	0.918	1.55	1.88	0.393
Has dangerous equipment	0.50	0.51	0.940	0.49	0.51	0.504
Uses welding machine	0.38	0.35	0.385	0.36	0.35	0.913
<b><i>Baseline Measures of Outcome Variables</i></b>						
Business practices score	0.57	0.56	0.593	0.56	0.56	0.541
Employment (incl. owner)	3.70	3.90	0.217	3.58	3.93	0.011**
Employment $\geq 5$	0.27	0.31	0.192	0.28	0.31	0.262
Employment $\geq 10$	0.03	0.03	0.999	0.01	0.03	0.016**
Total monthly salary	23.1	24.2	0.538	21.8	24.4	0.098*
Annual sales	773	916	0.057*	1099	870	0.468
Annual sales winsorized	774	800	0.597	757	803	0.368
Monthly sales	74	94	0.004***	102	91	0.678
Monthly sales winsorized	74	84	0.053*	72	85	0.038**
Monthly profits	3.8	9.6	0.443	8.0	9.1	0.819
Monthly profits winsorized	9.4	9.3	0.968	9.9	9.2	0.816
Inventory of finished goods	90	124	0.193	150	116	0.632
Equipment value	471	436	0.607	430	442	0.841
Productivity residual	0.072	0.004	0.270	0.075	0.002	0.202
Has loan from any source	0.48	0.53	0.129	0.50	0.52	0.495
Has loan from formal lender	0.37	0.42	0.148	0.39	0.42	0.285
Has bank account	0.66	0.66	0.933	0.64	0.66	0.447
Has bKash account	0.44	0.41	0.366	0.42	0.41	0.760
Has mobile bank account	0.43	0.43	0.799	0.42	0.43	0.787
Source input beyond district	0.09	0.11	0.131	0.10	0.11	0.683
Sell product beyond district	0.15	0.16	0.660	0.16	0.16	0.913
Member of trade org.	0.15	0.20	0.030**	0.17	0.20	0.155
Member of business coop.	0.18	0.16	0.355	0.17	0.16	0.444
<b><i>Sample Size</i></b>	235	2013	.	298	1950	.

Notes: Data source: Baseline firm survey. Baseline firm characteristics for attrited and observed firms at midline and endline. The p-value for testing equality of means (cols. 3 and 6) for a variable  $y$  comes from testing  $\beta = 0$  in regression  $y = \alpha + \beta \cdot attritted + \epsilon$  with standard errors clustered at the market level. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A3.3: Analysis of Attrition

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Midline Regression				Endline Regression			
	Attrit * OHS		Attrit * OHS+Biz		Attrit* OHS		Attrit * OHS+Biz	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
<b><i>Owner Characteristics</i></b>								
Owner is male	-0.001	0.811	0.002	0.636	-0.001	0.779	0.002	0.659
Owner's age	-0.215	0.913	-0.880	0.662	1.317	0.540	-2.091	0.257
Years of education	-0.357	0.485	-1.006	0.084*	-0.165	0.792	-0.668	0.251
Completed middle school	0.036	0.651	-0.136	0.102	0.028	0.741	-0.145	0.073*
Uses the Internet	-0.004	0.966	-0.083	0.345	-0.046	0.547	-0.067	0.401
<b><i>Firm Characteristics</i></b>								
Firm age	0.085	0.963	0.235	0.897	2.203	0.266	0.315	0.844
Has (hired) worker present	0.069	0.190	-0.006	0.926	0.143	0.001***	-0.018	0.777
Land size	1.346	0.303	1.346	0.236	1.427	0.244	1.414	0.165
Has dangerous equipment	-0.023	0.784	0.038	0.661	-0.016	0.845	0.038	0.629
Uses welding machine	-0.038	0.637	0.024	0.784	-0.010	0.896	0.118	0.153
<b><i>Baseline Measures of Outcome Variables</i></b>								
Business practices score	0.024	0.238	-0.022	0.350	0.027	0.158	-0.016	0.485
Employment (incl. owner)	-0.077	0.848	-0.342	0.373	0.375	0.283	-0.442	0.186
Employment $\geq 5$	-0.027	0.728	-0.052	0.524	0.075	0.340	-0.113	0.115
Employment $\geq 10$	-0.015	0.664	-0.046	0.017**	-0.007	0.759	0.004	0.870
Total monthly salary	5.016	0.290	-4.102	0.293	5.0	0.183	-5.4	0.136
Annual sales	143.5	0.421	115.8	0.478	-488.4	0.346	-697.8	0.167
Annual sales winsorized	79.3	0.537	-54.0	0.679	82.0	0.539	-232.6	0.019**
Monthly sales	14.5	0.440	3.8	0.816	-40.2	0.362	-14.4	0.792
Monthly sales winsorized	13.4	0.385	-1.5	0.911	7.5	0.612	6.3	0.728
Monthly profits	9.0	0.545	3.6	0.804	9.4	0.385	-2.6	0.793
Monthly profits winsorized	4.8	0.563	-0.1	0.986	12.8	0.081*	1.4	0.815
Inventory of finished goods	-56.8	0.437	15.1	0.772	-173.5	0.166	-30.5	0.810
Equipment value	-168.4	0.127	127.4	0.552	22.4	0.860	93.6	0.618
Productivity residual	0.058	0.765	-0.117	0.358	0.109	0.394	-0.105	0.377
Has loan from any source	-0.083	0.300	0.069	0.427	-0.102	0.209	0.06	0.468
Has loan from formal lender	-0.025	0.755	0.046	0.580	-0.176	0.014**	0.041	0.613
Has bank account	-0.010	0.904	-0.090	0.302	-0.042	0.590	-0.148	0.058*
Has bKash account	-0.073	0.377	-0.156	0.060*	-0.051	0.503	-0.057	0.461
Has mobile bank account	-0.087	0.282	-0.169	0.038**	-0.015	0.846	-0.159	0.033**
Source input beyond district	0.006	0.904	0.012	0.782	0.100	0.081*	0.000	0.993
Sell product beyond district	0.126	0.063*	0.027	0.622	0.096	0.142	0.072	0.215
Member of trade org.	0.015	0.825	-0.033	0.576	0.057	0.440	0.005	0.935
Member of business coop.	0.052	0.452	0.001	0.995	-0.076	0.167	0.02	0.755

*Notes:* Data source: Baseline firm survey. **Cols 1-4** of each row show the coefficient estimates and p-values of  $\beta_4$  and  $\beta_5$  from regression  $y = \alpha + \beta_1 \cdot OHS + \beta_2 \cdot OHS\_Biz + \beta_3 \cdot attritted + \beta_4 \cdot attritted \cdot OHS + \beta_5 \cdot attritted \cdot OHS\_Biz + \epsilon$  using the variable listed in each row as the outcome variable,  $y$ , and defining  $attritted$  as a dummy equal to one if the firm did not respond to the **midline** survey. **Cols 5-8** of each row show the coefficient estimates and p-values of  $\beta_4$  and  $\beta_5$  using the same regression equation where  $attritted$  is a dummy indicating attrition in the **endline** survey. Standard errors are clustered at the market level. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

## Appendix 4 Treatment Compliance and LATE Impacts

Compliance rates were high in all three arms. Among firms assigned to the OHS arm, 93.7% attended training. In the OHS+Biz arm, 93.3% attended training. Compliance rate is 95.8% in the control group – a small fraction (4.2%) of firms in the control group received both OHS and business training even though they were initially assigned neither.

Table [A4.1](#) compares the baseline characteristics of firms that complied and those that did not. For firms in the control group, compliers and non-compliers have similar baseline characteristics. Only 1 of 33 characteristics are significantly different at the 5% level – control group firms who received training were more likely to have membership in a trade organization at baseline.

For firms in the OHS arm, those who did not attend training were less likely to have employment above 10; they also had smaller payroll, monthly revenue, and finished goods inventory. For firms in the OHS+Biz arm, those who did not attend training were more likely to have an owner who did not complete high school and did not use the Internet; they were smaller in land size, employment, payroll, monthly sales, and total equipment value; they were less likely to have a formal loan, bank account, mobile bank account, or membership in a trade organization or a business coop; they also had lower business practices scores in the baseline; however, they had higher productivity (as measured by the productivity residual). However, given that the take-up rate is above 93% in both treatment arms, these differences between compliers and non-compliers are trivial in real economic terms.

Table [A4.2](#) presents the local average treatment effects (LATE) of receiving OHS or OHS+Biz training on our primary outcomes by instrumenting training attendance with training assignments.

Table A4.1: Baseline Firm Characteristics by Compliance Status

	(1) Control	(2) Group	(3) P-value	(4) OHS Arm	(5) OHS Arm	(6) P-value	(7) OHS+Biz Arm	(8) OHS+Biz Arm	(9) P-value
Complied with treatment:	Yes	No	(1)=(2)	Yes	No	(4)=(5)	Yes	No	(7)=(8)
<b>Sample Size</b>	1171	51	.	489	33	.	470	34	.
<b>Owner Characteristics</b>									
Owner is male	0.997	1.000	0.083*	0.998	1.000	0.319	0.996	1.000	0.157
Owner's age	39.4	41.7	0.162	39.6	41.0	0.474	38.9	41.7	0.151
Years of education	6.79	7.41	0.307	6.87	7.42	0.335	6.64	5.27	0.069*
Completed middle school	0.47	0.51	0.648	0.50	0.61	0.182	0.48	0.27	0.008***
Uses the Internet	0.36	0.26	0.090*	0.37	0.33	0.607	0.38	0.21	0.022**
<b>Firm Characteristics</b>									
Firm age	12.3	15.3	0.062*	12.8	16.2	0.080*	12.3	12.0	0.878
Has (hired) worker present	0.85	0.86	0.848	0.88	0.91	0.522	0.89	0.74	0.057*
Land size	2.04	1.52	0.360	1.72	1.05	0.076*	1.62	0.69	0.006***
Has dangerous equipment	0.49	0.45	0.642	0.52	0.42	0.283	0.54	0.44	0.333
Uses welding machine	0.35	0.35	0.989	0.36	0.33	0.758	0.35	0.29	0.500
<b>Baseline Measures of Outcome Variables</b>									
Business practices score	0.57	0.58	0.516	0.56	0.57	0.671	0.56	0.49	0.017**
Employment (incl. owner)	3.74	4.08	0.379	4.14	3.61	0.108	4.05	2.74	0.000***
Employment $\geq 5$	0.29	0.29	0.940	0.34	0.30	0.611	0.34	0.18	0.023**
Employment $\geq 10$	0.02	0.06	0.283	0.04	0.00	0.000***	0.03	0.00	0.000***
Total monthly salary	23.2	27.9	0.236	26.1	19.6	0.038**	24.8	14.5	0.035**
Annual sales	943	941	0.995	954	765	0.161	755	788	0.868
Annual sales winsorized	785	941	0.325	854	765	0.435	755	788	0.869
Monthly sales	90	83	0.614	108	62	0.000***	87	45	0.000***
Monthly sales winsorized	80	83	0.778	98	62	0.001***	81	45	0.000***
Monthly profits	5.5	-18.2	0.246	14.9	-8.0	0.141	15.3	12.7	0.698
Monthly profits winsorized	8.4	-6.0	0.201	11.6	-5.1	0.187	11.6	12.7	0.796
Inventory of finished goods	105	121	0.748	174	29	0.011**	114	57	0.140
Equipment value	422	396	0.684	447	611	0.272	486	219	0.000***
Productivity residual	0.038	0.006	0.820	-0.012	0.160	0.140	-0.064	0.321	0.001***
Has loan from any source	0.52	0.53	0.892	0.52	0.61	0.341	0.53	0.38	0.090*
Has loan from formal lender	0.41	0.45	0.599	0.43	0.36	0.482	0.44	0.21	0.001***
Has bank account	0.65	0.71	0.364	0.66	0.58	0.293	0.69	0.50	0.031**
Has bKash account	0.40	0.53	0.088*	0.44	0.27	0.055*	0.41	0.38	0.745
Has mobile bank account	0.42	0.55	0.074*	0.46	0.33	0.148	0.43	0.27	0.038**
Source input beyond district	0.13	0.16	0.579	0.10	0.18	0.240	0.08	0.09	0.852
Sell product beyond district	0.16	0.20	0.491	0.19	0.09	0.089*	0.16	0.12	0.486
Member of trade org.	0.18	0.35	0.013**	0.25	0.21	0.659	0.18	0.06	0.009***
Member of business coop.	0.16	0.24	0.217	0.14	0.06	0.056*	0.20	0.06	0.006***

Notes: Baseline firm characteristics for firms that complied (cols 1, 4, and 7) or did not comply (cols 2, 3, and 8) with initial treatment assignment within each treatment arm (e.g., col 2 includes firms who were initially assigned to control but received OHS+Biz treatment instead; col 5 (8) includes firms who were initially assigned OHS (OHS+Biz) treatment but did not take up any training). The p-value for testing equality of means (cols 3, 6, and 9) for a variable  $y$  comes from testing  $\beta = 0$  in regression  $y = \alpha + \beta \cdot \text{complied} + \epsilon$  with standard errors clustered at the market level (each regression includes only the subsample of firms in the control/OHS/OHS+Biz group). Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table A4.2: LATE Impacts for Primary Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OHS Practices			Management Practices		<b>Overall</b>	OHS Awareness		Workers'
	Safety Practices	Work Environment	Fair Labor Practice	Material Management	Accounting Practices	<b>Business Practices</b>	Safety Knowledge	Safety Discussion	Rating of Work Envr.
OHS [1]	0.087*** (0.007)	0.031*** (0.008)	0.015 (0.010)	0.040** (0.017)	0.139*** (0.025)	0.060*** (0.006)	0.078*** (0.009)	0.036*** (0.008)	1.115*** (0.209)
OHS + Biz [2]	0.086*** (0.007)	0.033*** (0.007)	0.035*** (0.009)	0.040** (0.016)	0.156*** (0.025)	0.064*** (0.006)	0.071*** (0.008)	0.043*** (0.007)	1.381*** (0.187)
P-value: [1]=[2]	0.932	0.850	0.0780	0.968	0.560	0.514	0.384	0.400	0.250
Observations	3,963	3,963	3,963	3,963	3,963	3,963	3,963	3,963	3,146
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	Current Emp. Level		Avg Emp. Last Year Log		Total Monthly Salary Level IHS		<b>Employment Index</b>	Worker Retention N. Retained % Retained	
OHS [1]	0.070 (0.084)	0.039 (0.025)	0.147 (0.139)	0.025 (0.026)	1.975* (1.170)	0.150** (0.068)	0.054 (0.037)	0.100 (0.101)	0.013 (0.020)
OHS + Biz [2]	0.165* (0.094)	0.047* (0.027)	0.295** (0.137)	0.055* (0.029)	2.271* (1.174)	0.097 (0.073)	0.082* (0.042)	0.038 (0.099)	0.003 (0.019)
P-value: [1]=[2]	0.372	0.795	0.281	0.334	0.831	0.519	0.533	0.595	0.638
Observations	3,963	3,963	3,963	3,963	3,963	3,963	3,963	3,201	3,201
	(19)	(20)	(21)	(22)	(23)	(24)	(25)		
	Annual Sales	Monthly Sales	Monthly Profits	Finished Goods Inventory	<b>Output Index</b>	Value of Equipment	Productivity Residual		
OHS [1]	0.144*** (0.054)	0.079 (0.053)	0.068 (0.122)	0.412*** (0.134)	0.162*** (0.058)	-0.000 (0.048)	0.079* (0.044)		
OHS + Biz [2]	0.100** (0.048)	0.089* (0.051)	0.099 (0.135)	0.199 (0.139)	0.123** (0.055)	0.094* (0.051)	0.018 (0.039)		
P-value: [1]=[2]	0.471	0.868	0.831	0.160	0.548	0.0940	0.209		
Observations	3,963	3,963	3,963	3,963	3,963	3,963	3,963		

Notes: Each column is a separate IV regression pooling midline and endline data, using the assignment of OHS training as an instrument of attending OHS training and the assignment of OHS+Biz training as an instrument for attending OHS+Biz training. All regressions (except those in cols. 7-9) also control for the baseline value of the outcome variable. Unit of observation is at the firm-wave level. Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



## Appendix 5 Business Practices According to Workers' and Enumerators' Assessments

Table A5.1: Effect on Practices and Awareness According to Workers and Enumerators

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OHS Practices			Management Practices		Overall	OHS Awareness	
	Safety Practices Score	Work Envr. Score	Fair Labor Score	Material Mgmt. Score	Accounting Practices Score	Business Practices Score	Safety Knowledge Score	Safety Discussion Score
<i>Panel A: According to <b>Workers'</b> Assessment</i>								
OHS [1]	0.072*** (0.007)	0.026*** (0.008)	0.005 (0.007)	0.041** (0.018)	0.118*** (0.025)	0.049*** (0.006)	0.078*** (0.011)	0.030*** (0.008)
OHS + Biz [2]	0.078*** (0.007)	0.029*** (0.007)	0.010* (0.006)	0.059*** (0.015)	0.140*** (0.024)	0.056*** (0.006)	0.074*** (0.010)	0.038*** (0.008)
<b>Correlation with owners'</b>	0.821	0.809	0.599	0.809	0.858	0.841	0.658	0.585
P-value: [1]=[2]	0.492	0.671	0.499	0.359	0.449	0.337	0.683	0.458
Observations	3,146	3,146	3,146	3,146	3,026	3,146	3,146	3,146
Control mean	0.652	0.560	0.678	0.725	0.533	0.621	0.793	0.885
Control S.D.	0.133	0.145	0.126	0.274	0.477	0.107	0.228	0.179
<i>Panel B: According to <b>Enumerators'</b> Assessment</i>								
OHS [1]	0.071*** (0.008)	0.022** (0.009)	–	0.037** (0.016)	0.122*** (0.024)	0.054*** (0.007)	–	–
OHS + Biz [2]	0.081*** (0.008)	0.035*** (0.008)	–	0.050*** (0.015)	0.142*** (0.025)	0.068*** (0.007)	–	–
<b>Correlation with owners'</b>	0.662	0.747	–	0.792	0.902	0.775	–	–
P-value: [1]=[2]	0.307	0.202	–	0.505	0.508	0.114	–	–
Observations	3,963	3,963	–	3,963	3,953	3,963	–	–
Control mean	0.609	0.500	–	0.703	0.478	0.556	–	–
Control S.D.	0.159	0.150	–	0.266	0.476	0.130	–	–

*Notes:* Each column in each panel is a separate regression pooling midline and endline data. Regressions in cols. 1-6 use the ANCOVA specification. Regressions in col. 7-9 use simple linear regressions without controlling for baseline values of the outcome variable, as the outcomes in these columns were not measured at baseline. Unit of observation is at the firm-wave level. Sample in Panel A includes only firms with at least one worker present on the day of the survey. Robust standard errors clustered at the market level are shown in parentheses. "Correlation with owners'" shows the correlation coefficient between the outcome variable and firm owners' report of the same outcome. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## **Appendix 6   Impact on Individual Practices and Detailed Outcomes**

Table A6.1: Effects on Individual Business Practices

<i>Practice Area</i>	<i>OHS or Management Practice</i>	<i>Treatment Effect</i>		<i>P-value</i>	Control group Mean
		OHS [1]	OHS+Biz [2]	[1]=[2]	
Safety	Electricity connection is safe	0.006	0.002	0.787	0.924
Safety	No short-circuit	0.004	-0.004	0.681	0.830
Safety	Frequency checking electricity connection	0.101**	0.146***	0.457	1.561
Safety	Electrical wiring is safe	-0.003	-0.004	0.977	0.883
Safety	Electrical wiring is tested	0.080***	0.043	0.181	0.698
Safety	Earthing system in place	0.013	0.009	0.817	0.889
Safety	First aid box available	0.439***	0.432***	0.783	0.310
Safety	Machines functional and maintained	-0.001	0.005	0.163	0.991
Safety	Safe operation of machinery	0.009*	0.013***	0.440	0.977
Safety	Machine safeguard in place	0.071***	0.069**	0.929	0.381
Safety	Fire extinguishing system in place	0.207***	0.212***	0.884	0.226
Safety	Safety signs in place	0.127***	0.142***	0.499	0.049
Safety	Workers have and use safety instrument	0.052***	0.066***	0.268	0.879
Safety	Emergency stop switch available	0.040**	0.049**	0.702	0.768
Safety	Safety inspection and maintenance	0.069***	0.070***	0.925	0.845
Work Envr.	Overall cleanliness	0.037*	0.030	0.786	2.940
Work Envr.	Uses a bin for waste disposal.	0.157***	0.156***	0.979	0.405
Work Envr.	Frequency of mopping or sweeping	-0.032	0.045*	0.014	3.796
Work Envr.	Light and air flow is sufficient	0.025	0.044**	0.382	0.820
Work Envr.	Has windows with light and air flow	-0.004	-0.008	0.859	0.151
Work Envr.	Has shutters with light and air flow	0.027	0.042**	0.501	0.834
Work Envr.	Has sufficient fans and light bulbs	0.007	0.009	0.771	0.961
Work Envr.	Work space is sufficient	0.003	0.034*	0.190	0.747
Work Envr.	Filtered water available for drinking	0.018	0.040	0.465	0.240
Work Envr.	Drainage system in place	0.014	0.006	0.805	0.426
Work Envr.	Toilets available nearby	0.034*	-0.016	0.028	0.804
Work Envr.	Both male and female toilets nearby	-0.010	0.003	0.592	0.163
Work Envr.	At least one toilet available on site	0.043**	0.020	0.232	0.102
Work Envr.	The toilets are cleaned regularly	0.031	0.004	0.351	0.643
Fair Labor	Appointment letters are issued	0.012**	0.010	0.762	0.011
Fair Labor	Festival bonus every year	0.006	0.031*	0.244	0.763
Fair Labor	Weekly off day(s)	0.015	0.036**	0.231	0.898
Fair Labor	Sick leave	0.019	0.040***	0.136	0.900
Fair Labor	Paternity/maternity leave	0.014	0.052**	0.171	0.303
Fair Labor	Timely salary payment	0.015	0.032***	0.188	0.904
Material Mgmt.	Scrap management in place	0.002	-0.000	0.809	0.961
Material Mgmt.	Store management for raw materials	0.015	0.026	0.744	0.567
Material Mgmt.	Raw material managed and kept in order	0.089***	0.085***	0.888	0.697
Accounting	Income-expenditure account in writing	0.135***	0.152***	0.557	0.480
Accounting	Raw material account in writing	0.114***	0.127***	0.654	0.474
Accounting	Sales account in writing	0.126***	0.145***	0.510	0.475

*Notes:* Each **row** is a separate ANCOVA regression, pooling midline and endline data (N = 3,963). Outcome variables are binary with the exception of three – “frequency checking electricity connection”, “overall cleanliness”, “frequency of mopping or sweeping” – which take values 1 to 4. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A6.2: Effects on Individual OHS Awareness Questions

<i>Area</i>	<i>Awareness Item</i>	<i>Treatment Effect</i>		<i>P-value</i>	<i>Control</i>
		OHS [1]	OHS+Biz [2]	[1]=[2]	Mean
Knowl.	Everyone knows required safety info	0.042***	0.037***	0.703	0.885
Knowl.	Everyone has first-aid knowledge during emergency	0.119***	0.093***	0.127	0.747
Knowl.	Everyone has first-aid knowledge during non-emergency	0.124***	0.101***	0.141	0.739
Knowl.	Co-workers cooperate and reinforce about precautions	0.034***	0.041***	0.540	0.881
Knowl.	Safety is considered with grave importance	0.044***	0.046***	0.815	0.923
Knowl.	Safety regulations & processes decided in advance	0.082***	0.080***	0.948	0.713
Knowl.	I am aware of the necessity of following safety rules	0.049***	0.047***	0.836	0.907
Discuss.	Authority and staff work together to ensure safety	0.025**	0.041***	0.107	0.910
Discuss.	Authority responds quickly to any safety issue	0.028***	0.025***	0.709	0.944
Discuss.	Authority solicits staff inputs regarding safety	0.019*	0.026***	0.473	0.921
Discuss.	Workers are informed if they violate safety rules	0.041***	0.047***	0.584	0.903
Discuss.	Safety is frequently discussed in the workplace	0.055***	0.069***	0.312	0.840
Discuss.	Workers are often asked about safety concerns	0.047***	0.063***	0.243	0.844
Discuss.	Workers are welcome to express safety concerns	0.022**	0.026***	0.682	0.924
Discuss.	Workers aware of rights & responsibilities re: safety	0.019**	0.014**	0.523	0.943

*Notes:* Each **row** is a separate linear regression (without controlling for baseline values of the outcome variable as the outcomes were not measured at baseline). N = 3,963 for all regressions. All outcome variables are coded as 1 = agree, 0.5 = partly agree, 0 = disagree. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A6.3: Effects on Detailed Financial Linkage and Market Linkage Outcomes

<i>Area</i>	<i>Detailed Item</i>	<i>Treatment Effect</i>		<i>P-value</i>	<i>Control</i>
		OHS [1]	OHS+Biz [2]	[1]=[2]	Mean
Financial	Has loan from any source	-0.013	0.017	0.229	0.507
Financial	Has loan from formal lender	-0.014	0.019	0.189	0.451
Financial	Has bank account	0.022	0.004	0.527	0.356
Financial	Has bKash account	0.012	0.003	0.738	0.504
Financial	Has mobile bank account	-0.001	0.002	0.917	0.538
Market	Source input beyond district	0.061**	0.047*	0.627	0.321
Market	Sell product beyond district	0.005	0.034	0.364	0.207
Market	Member of trade org.	0.085***	0.043*	0.123	0.211
Market	Member of business coop.	0.105***	0.057**	0.140	0.361

*Notes:* Each **row** is a separate regression using the ANCOVA specification, pooling midline and endline data. N = 3,963 for all regressions. All outcome variables are binary. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A6.4: Effects on Detailed Business Attitude, Life Attitude, and Management Skills

<i>Area</i>	<i>Detailed Item</i>	<i>Treatment Effect</i>		<i>P-value</i>	<i>Control</i>
		OHS [1]	OHS+Biz [2]	[1]=[2]	Mean
Business Att.	Always improving	0.028	0.004	0.670	4.661
Business Att.	Care about my clients	0.090	0.053	0.654	1.988
Business Att.	Take risks	0.014	0.057	0.638	1.892
Business Att.	Make long-term plans	-0.039	0.050	0.391	2.748
Business Att.	No hasty decisions	0.133	0.188**	0.556	3.195
Business Att.	Try to make others understand my view	-0.076	-0.056	0.766	4.462
Business Att.	Always making new connections	-0.001	-0.053	0.386	4.544
Business Att.	Seek continuous business improvement	0.186**	0.172**	0.891	3.240
Life Att.	Can socialize easily	0.031	0.099**	0.153	4.648
Life Att.	Work carefully and accurately	0.001	0.042***	0.051	4.916
Life Att.	Good at finding new ideas	0.068	0.070	0.969	4.640
Life Att.	Not too introverted	0.014	0.156	0.264	3.625
Life Att.	Can handle pressure	0.115**	0.026	0.125	4.462
Life Att.	Forgiving	-0.041	0.037	0.132	4.647
Life Att.	Not worried about small things	0.038	0.143	0.387	2.949
Life Att.	Strong imagination	0.041	0.101*	0.338	4.252
Life Att.	Not lazy	-0.049	-0.056	0.948	4.434
Life Att.	Kind and tolerant towards others	-0.004	0.030	0.423	4.697
Life Att.	Do everything successfully and efficiently	-0.016	0.058**	0.030	4.828
Life Att.	Not harsh towards others	0.036	0.173	0.249	3.317
Life Att.	Patient	0.107	0.181*	0.520	3.660
Life Att.	Like to take risks in any job.	0.086	0.115	0.786	3.820
Life Att.	Can solve difficulties	0.066	0.029	0.454	4.580
Mgmt Skills	Accounting skill	0.077**	0.037	0.357	4.247
Mgmt Skills	Communication skill	0.117***	0.081**	0.379	4.284
Mgmt Skills	Financial literacy	0.107***	0.079*	0.531	4.129
Mgmt Skills	Social skill	0.127***	0.094***	0.367	4.335
Mgmt Skills	Empathy	0.132***	0.064*	0.098	4.212
Mgmt Skills	Leadership skill	0.180***	0.169***	0.853	3.944
Mgmt Skills	Organizing skill	0.221***	0.226***	0.930	3.805
Mgmt Skills	Working in team	0.232***	0.202***	0.606	4.000

*Notes:* Each **row** is a separate linear regression (without controlling for baseline values of the outcome variable as the outcomes were not measured at baseline). N = 3,963 for “Business Attitude” items and “Management Skills” items (pooling midline and endline data). N = 1,950 for “Life Attitude” items (as these items were only measured at endline). Outcome variables are coded 1 to 5, with 1 being the lowest and 5 the highest. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## Appendix 7 Trajectory of Impacts Over Time

Table A7.1: Effect on Business Practices and OHS Awareness During Each Follow-up

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OHS Practices			Mgmt. Practices		Overall	OHS Awareness		Workers'
	Safety Pract. Score	Work Envr. Score	Fair Labor Score	Material Mgmt. Score	Acct. Pract. Score	Business Pract. Score	Safety Knowl. Score	Safety Discuss. Score	Rating of Work Envr.
<i>Panel A: Effects During the First Follow-up (Midline)</i>									
OHS [1]	0.082*** (0.008)	0.028*** (0.009)	0.011 (0.012)	0.072*** (0.021)	0.111*** (0.027)	0.057*** (0.007)	0.080*** (0.012)	0.039*** (0.010)	1.186*** (0.259)
OHS + Biz [2]	0.079*** (0.008)	0.029*** (0.009)	0.033** (0.014)	0.040** (0.018)	0.126*** (0.028)	0.058*** (0.006)	0.068*** (0.012)	0.037*** (0.010)	1.269*** (0.233)
P-value:[1]=[2]	0.718	0.867	0.161	0.187	0.647	0.876	0.325	0.872	0.774
Observations	2,013	2,013	2,013	2,013	2,013	2,013	2,013	2,013	1,623
Control mean	0.653	0.562	0.610	0.708	0.501	0.609	0.807	0.886	4.221
Control S.D.	0.122	0.140	0.212	0.269	0.483	0.105	0.205	0.179	3.085
<i>Panel B: Effects During the Second Follow-up (Endline)</i>									
OHS [3]	0.073*** (0.008)	0.028*** (0.009)	0.013 (0.014)	-0.001 (0.018)	0.137*** (0.029)	0.050*** (0.007)	0.060*** (0.010)	0.024** (0.010)	0.761*** (0.222)
OHS + Biz [4]	0.076*** (0.008)	0.030*** (0.009)	0.030*** (0.009)	0.033* (0.018)	0.156*** (0.027)	0.058*** (0.007)	0.059*** (0.011)	0.040*** (0.008)	1.222*** (0.214)
P-value:[3]=[4]	0.745	0.854	0.216	0.118	0.562	0.352	0.888	0.099	0.064
Observations	1,950	1,950	1,950	1,950	1,950	1,950	1,950	1,950	1,523
Control mean	0.686	0.578	0.651	0.777	0.451	0.633	0.849	0.923	3.856
Control S.D.	0.118	0.131	0.179	0.264	0.469	0.104	0.185	0.160	3.069
P-value:[1]=[3]	0.319	0.973	0.934	0.003	0.411	0.421	0.144	0.278	0.147
P-value:[2]=[4]	0.758	0.963	0.872	0.752	0.323	0.979	0.540	0.820	0.873

*Notes:* Each column in each panel is a separate regression. Regressions in cols. 1-6 use the ANCOVA specification. Regressions in cols. 7-9 use simple linear regressions without controlling for baseline values of the outcome variable, as the outcomes in these columns were not measured at baseline. Unit of observation is at the firm-wave level. Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A7.2: Effects on Firm Employment and Worker Retention During Each Follow-up

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Current		Avg Employment		Total Monthly		<b>Agg.</b>	Worker Retention	
	Employment		Last Year		Salary (thousands)		<b>Emp.</b>	Number	Percent
	Level	Log	Level	Log	Level	IHS	<b>Index</b>	Retained	Retained
<i>Panel A: Effects During the First Follow-up (Midline)</i>									
OHS [1]	0.135	0.043*	0.222*	0.033	2.726**	0.146**	0.075*	0.118	0.018
	(0.085)	(0.025)	(0.134)	(0.026)	(1.266)	(0.070)	(0.040)	(0.100)	(0.024)
OHS + Biz [2]	0.224**	0.051*	0.333**	0.057*	2.718**	0.096	0.099**	0.114	0.030
	(0.096)	(0.027)	(0.133)	(0.029)	(1.321)	(0.072)	(0.045)	(0.105)	(0.025)
P-value: [1] = [2]	0.422	0.793	0.440	0.461	0.996	0.549	0.636	0.975	0.685
Observations	2,013	2,013	2,013	2,013	2,013	2,013	2,013	1,751	1,751
Control mean	3.290	0.998	3.291	0.999	21.79	2.901	0	1.825	0.520
Control S.D.	2.052	0.641	2.051	0.640	24.27	1.685	1	1.834	0.388
<i>Panel B: Effects During the Second Follow-up (Endline)</i>									
OHS [3]	-0.020	0.026	0.025	0.008	0.759	0.125	0.017	0.059	0.004
	(0.098)	(0.028)	(0.140)	(0.029)	(1.290)	(0.077)	(0.041)	(0.117)	(0.025)
OHS + Biz [4]	0.070	0.033	0.195	0.042	1.340	0.077	0.048	-0.060	-0.030
	(0.099)	(0.029)	(0.132)	(0.031)	(1.164)	(0.080)	(0.042)	(0.104)	(0.023)
P-value: [3] = [4]	0.456	0.834	0.225	0.335	0.700	0.610	0.528	0.376	0.229
Observations	1,950	1,950	1,950	1,950	1,950	1,950	1,950	1,450	1,450
Control mean	3.435	1.013	3.432	1.014	23.29	2.931	0	2.131	0.632
Control S.D.	2.398	0.674	2.385	0.672	27.22	1.712	1	1.987	0.372
P-value: [1] = [3]	0.114	0.540	0.043	0.370	0.148	0.785	0.168	0.590	0.663
P-value: [2] = [4]	0.107	0.527	0.148	0.596	0.297	0.801	0.224	0.109	0.078

*Notes:* Each column in each panel is a separate regression using the ANCOVA specification. Unit of observation is at the firm-wave level. Sample in cols. 8-9 is restricted to firms with at least one hired worker in the baseline survey. Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



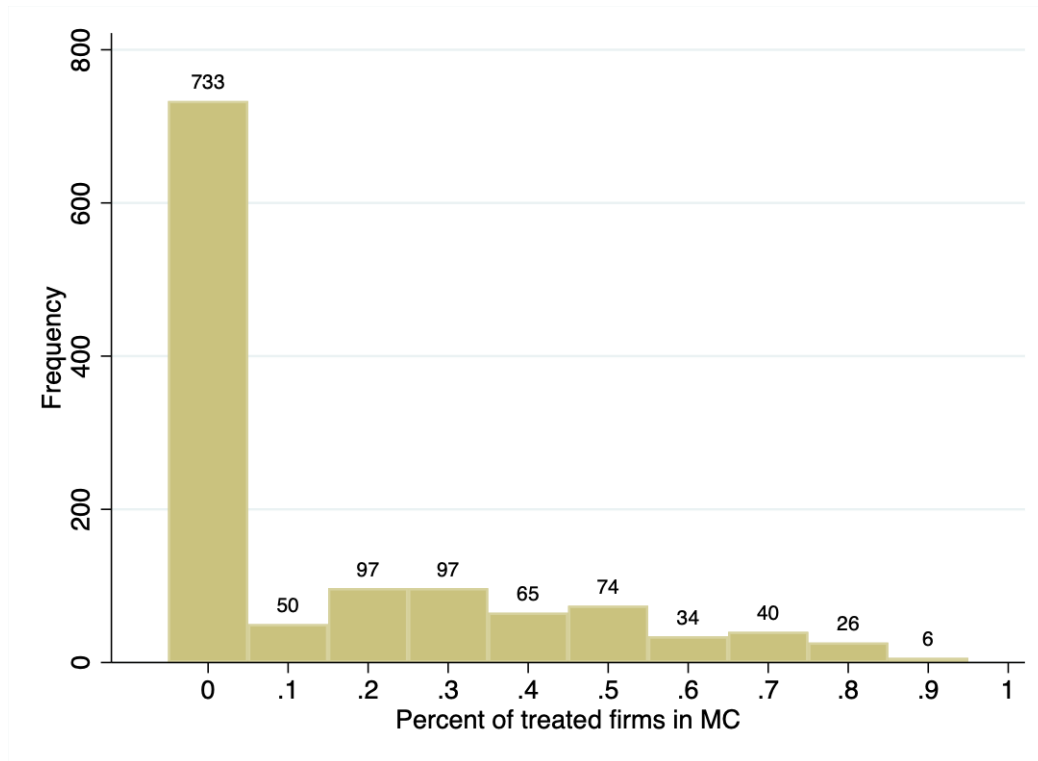
Table A7.3: Effects on Linkage, Attitudes, and Skills During Each Follow-up

	(1) Financial Linkage Index	(2) Market Linkage Index	(3) Business Attitude Index	(4) Life Attitude Index	(5) Management Skills Index
<i>Panel A: Effects During the First Follow-up (Midline)</i>					
OHS [1]	-0.034 (0.048)	0.219*** (0.069)	0.024 (0.081)	–	0.219*** (0.067)
OHS + Biz [2]	0.066 (0.050)	0.255*** (0.067)	0.024 (0.074)	–	0.174*** (0.059)
P-value: [1] = [2]	0.089	0.656	0.999	–	0.544
Observations	2,013	2,013	2,013	–	2,013
<i>Panel B: Effects During the Second Follow-up (Endline)</i>					
OHS [3]	0.033 (0.051)	0.270*** (0.066)	0.108 (0.079)	0.076 (0.063)	0.201*** (0.062)
OHS + Biz [4]	-0.011 (0.055)	0.114 (0.071)	0.149** (0.063)	0.203*** (0.062)	0.153*** (0.068)
P-value: [3] = [4]	0.483	0.039	0.633	0.075	0.475
Observations	1,950	1,950	1,950	1,950	1,950
P-value: [1] = [3]	0.238	0.557	0.410	–	0.841
P-value: [2] = [4]	0.182	0.083	0.162	–	0.794

*Notes:* Each column is a separate regression. Regressions in cols. 1 and 2 use the ANCOVA specification. Regressions in cols. 3-5 use simple linear regressions without controlling for baseline values of the outcome variable, as the outcomes in these columns were not measured at baseline. Unit of observation is at the firm-wave level. “Life attitude index” (col. 4) is only measured at endline as questions regarding life attitude were only asked in the endline survey. Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

## Appendix 8 Spillover Effects on Nearby Markets Within Market Cluster

Figure A8.1: Histogram of Control-Group Firms by Percent of Treated Firms in Market Cluster



*Notes:* Randomization was carried out at the market level. However, 40.7% of market clusters (MCs) had two or more markets. As a result, some MCs had both treated markets and control-group markets. This graph shows the frequency of control-group firms by the percent of treated firms in the MC (where the control group is located). The x-axis indicates the percent of treated firms in the same MC as the control-group firm. The y-axis indicates the frequency of control-group firms in each group. Sample includes all control group firms at baseline ( $N = 1,222$ ). Frequencies are labeled on top of each bar.

Table A8.1: Effect on Business Practices and OHS Awareness During Each Follow-up

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OHS Practices			Mgmt. Practices		Overall	OHS Awareness		Workers'
	Safety Pract. Score	Work Envr. Score	Fair Labor Score	Material Mgmt. Score	Acct. Pract. Score	Business Pract. Score	Safety Knowl. Score	Safety Discuss. Score	Rating of Work Envr.
<i>Panel A: Specification 1 - A dummy indicating control-group firms in treated MC</i>									
OHS	0.079*** (0.008)	0.031*** (0.008)	0.021* (0.011)	0.026 (0.017)	0.122*** (0.026)	0.056*** (0.006)	0.071*** (0.010)	0.035*** (0.009)	0.993*** (0.214)
OHS + Biz	0.079*** (0.008)	0.032*** (0.007)	0.040*** (0.010)	0.027* (0.016)	0.140*** (0.025)	0.060*** (0.006)	0.064*** (0.009)	0.042*** (0.007)	1.262*** (0.193)
Control firm in treated MC	0.004 (0.007)	0.006 (0.007)	0.020** (0.010)	-0.024* (0.014)	-0.002 (0.024)	0.005 (0.006)	0.001 (0.010)	0.008 (0.007)	0.041 (0.181)
<i>Panel B: Specification 2 - Control-group firm × Percentage of OHS or OHS+Biz treated firms in MC</i>									
OHS	0.079*** (0.008)	0.032*** (0.007)	0.020** (0.010)	0.036** (0.016)	0.121*** (0.025)	0.056*** (0.006)	0.069*** (0.010)	0.035*** (0.008)	0.969*** (0.208)
OHS + Biz	0.078*** (0.007)	0.033*** (0.007)	0.040*** (0.009)	0.037** (0.016)	0.137*** (0.025)	0.060*** (0.006)	0.063*** (0.009)	0.041*** (0.007)	1.218*** (0.186)
Control× % OHS -treated	0.016 (0.020)	0.023 (0.020)	0.046* (0.024)	-0.010 (0.038)	0.000 (0.068)	0.016 (0.015)	0.014 (0.029)	0.022 (0.022)	-0.124 (0.475)
Control× % OHS+Biz -treated	-0.009 (0.021)	0.022 (0.022)	0.050 (0.033)	0.014 (0.043)	-0.037 (0.072)	0.015 (0.016)	-0.033 (0.032)	0.006 (0.025)	-0.072 (0.523)
N. firms in MC	-0.000 (0.001)	-0.001*** (0.001)	0.001 (0.001)	0.000 (0.001)	-0.001 (0.002)	-0.000 (0.001)	0.001 (0.001)	-0.001 (0.001)	-0.017 (0.014)
<i>Panel C: Specification 3 - Control-group firm × Number of OHS or OHS+Biz treated firms in MC</i>									
OHS	0.080*** (0.007)	0.030*** (0.007)	0.017* (0.010)	0.039** (0.016)	0.123*** (0.024)	0.056*** (0.006)	0.069*** (0.009)	0.035*** (0.008)	1.002*** (0.202)
OHS + Biz	0.079*** (0.007)	0.031*** (0.007)	0.037*** (0.009)	0.040*** (0.015)	0.138*** (0.024)	0.060*** (0.005)	0.063*** (0.008)	0.041*** (0.007)	1.247*** (0.181)
Control× N. OHS -treated	0.003* (0.001)	-0.001 (0.002)	0.004* (0.002)	0.003 (0.004)	0.007 (0.007)	0.002 (0.001)	0.003 (0.003)	0.004* (0.002)	0.020 (0.040)
Control× N. OHS+Biz -treated	-0.000 (0.003)	0.004 (0.003)	0.004 (0.004)	0.001 (0.006)	-0.012 (0.012)	0.002 (0.002)	-0.007 (0.004)	-0.001 (0.003)	-0.003 (0.074)
N. firms in MC	-0.001 (0.001)	-0.001** (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.001 (0.002)	-0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	-0.020 (0.016)
Observations	3,963	3,963	3,963	3,963	3,963	3,963	3,963	3,963	3,146

*Notes:* Each column in each panel is a separate regression. “% OHS-treated” refers to the percentage of firms within the MC that were in the OHS arm. “N. OHS-treated” refers to the number of firms within the MC that were in the OHS arm. “N. firms in MC” refers to the total number of experimental firms in the MC. Regressions in cols. 1-6 use the ANCOVA specification. Regressions in col. 7-9 use simple linear regressions without controlling for baseline values of the outcome variable, as the outcomes in these columns were not measured at baseline. Unit of observation is at the firm-wave level. Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A8.2: Spillover Effects - Firm Employment and Worker Retention

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Current		Avg Employment		Total Monthly		<b>Agg.</b>	Worker Retention	
	Employment		Last Year		Salary (thousands)		<b>Emp.</b>	Number	Percent
	Level	Log	Level	Log	Level	IHS	<b>Index</b>	Retained	Retained
<i>Panel A: Specification 1 - A <b>dummy</b> indicating control-group firms in treated MC</i>									
OHS	0.079 (0.085)	0.050** (0.025)	0.204 (0.150)	0.042 (0.027)	1.829 (1.140)	0.195*** (0.069)	0.071* (0.039)	0.135 (0.098)	0.016 (0.020)
OHS + Biz	0.169* (0.092)	0.057** (0.026)	0.344** (0.141)	0.071** (0.029)	2.122* (1.127)	0.145** (0.072)	0.099** (0.042)	0.077 (0.094)	0.006 (0.019)
Control firm in treated MC	0.050 (0.085)	0.036 (0.025)	0.194* (0.113)	0.053* (0.027)	0.191 (1.079)	0.143** (0.066)	0.060 (0.039)	0.103 (0.100)	0.010 (0.021)
<i>Panel B: Specification 2 - Control-group firm × <b>Percentage</b> of OHS or OHS+Biz treated firms in MC</i>									
OHS	0.071 (0.085)	0.047* (0.024)	0.189 (0.149)	0.039 (0.026)	1.817 (1.167)	0.180*** (0.067)	0.065* (0.038)	0.139 (0.099)	0.019 (0.019)
OHS + Biz	0.171* (0.090)	0.058** (0.026)	0.338** (0.137)	0.072** (0.028)	2.179* (1.128)	0.139** (0.070)	0.098** (0.040)	0.085 (0.095)	0.010 (0.019)
Control× % OHS -treated	-0.184 (0.239)	0.006 (0.074)	0.115 (0.311)	0.064 (0.085)	-2.470 (2.915)	0.083 (0.202)	0.006 (0.113)	0.007 (0.283)	-0.052 (0.062)
Control× % OHS+Biz -treated	0.486* (0.284)	0.184** (0.080)	0.814** (0.379)	0.209** (0.090)	4.534 (3.422)	0.564*** (0.186)	0.296** (0.124)	0.654** (0.310)	0.162*** (0.052)
N. firms in MC	0.009 (0.006)	0.003 (0.002)	0.008 (0.009)	0.004** (0.002)	0.065 (0.081)	0.008 (0.005)	0.006** (0.003)	0.003 (0.009)	0.000 (0.002)
<i>Panel C: Specification 3 - Control-group firm × <b>Number</b> of OHS or OHS+Biz treated firms in MC</i>									
OHS	0.089 (0.084)	0.047* (0.024)	0.199 (0.145)	0.041 (0.026)	2.034* (1.150)	0.170** (0.067)	0.069* (0.038)	0.145 (0.097)	0.021 (0.019)
OHS + Biz	0.187** (0.089)	0.057** (0.025)	0.343*** (0.133)	0.073** (0.029)	2.371** (1.104)	0.127* (0.069)	0.101** (0.040)	0.087 (0.093)	0.011 (0.018)
Control× <b>N.</b> OHS -treated	-0.015 (0.021)	0.000 (0.009)	0.012 (0.037)	0.011 (0.013)	-0.124 (0.267)	0.006 (0.027)	0.003 (0.013)	0.002 (0.027)	-0.001 (0.007)
Control× <b>N.</b> OHS+Biz -treated	0.088** (0.040)	0.026** (0.011)	0.131** (0.059)	0.028** (0.013)	0.762 (0.493)	0.065** (0.028)	0.044** (0.017)	0.098* (0.054)	0.018** (0.009)
N. firms in MC	0.007 (0.007)	0.002 (0.002)	0.003 (0.010)	0.003 (0.002)	0.043 (0.089)	0.006 (0.006)	0.004 (0.003)	0.000 (0.009)	-0.000 (0.002)
Observations	3,963	3,963	3,963	3,963	3,963	3,963	3,963	3,201	3,201

*Notes:* Each column in each panel is a separate regression using the ANCOVA specification. “% OHS-treated” refers to the percentage of firms within the MC that were in the OHS arm. “N. OHS-treated” refers to the number of firms within the MC that were in the OHS arm. “N. firms in MC” refers to the total number of light engineering firms in the MC. Unit of observation is at the firm-wave level. Sample in cols. 8-9 is restricted to firms with at least one hired worker in the baseline survey. Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A8.3: Spillover Effects - Linkage, Attitudes, and Skills

	(1) Financial Linkage Index	(2) Market Linkage Index	(3) Business Attitude Index	(4) Life Attitude Index	(5) Management Skills Index
<i>Panel A: Specification 1 - A <b>dummy</b> indicating control-group firms in treated MC</i>					
OHS	0.024 (0.044)	0.279*** (0.057)	0.066 (0.067)	0.104 (0.070)	0.230*** (0.051)
OHS + Biz	0.052 (0.047)	0.220*** (0.061)	0.086 (0.058)	0.232*** (0.069)	0.183*** (0.054)
Control firm in treated MC	0.060 (0.046)	0.086 (0.055)	0.002 (0.053)	0.071 (0.071)	0.049 (0.060)
<i>Panel B: Specification 2 - Control-group firm × <b>Percentage</b> of OHS or OHS+Biz treated firms in MC</i>					
OHS	0.025 (0.043)	0.265*** (0.058)	0.062 (0.065)	0.114 (0.069)	0.206*** (0.052)
OHS + Biz	0.052 (0.046)	0.215*** (0.059)	0.084 (0.057)	0.243*** (0.067)	0.165*** (0.054)
Control× % OHS-treated	0.233 (0.147)	0.266* (0.148)	-0.014 (0.135)	0.364* (0.190)	0.173 (0.158)
Control× % OHS+Biz-treated	0.057 (0.136)	0.021 (0.160)	-0.019 (0.166)	0.082 (0.224)	-0.233 (0.146)
N. firms in MC	-0.001 (0.003)	0.009 (0.006)	0.001 (0.005)	0.002 (0.007)	0.005 (0.004)
<i>Panel C: Specification 3 - Control-group firm × <b>Number</b> of OHS or OHS+Biz treated firms in MC</i>					
OHS	0.009 (0.043)	0.253*** (0.056)	0.056 (0.063)	0.102 (0.068)	0.206*** (0.051)
OHS + Biz	0.036 (0.046)	0.203*** (0.057)	0.078 (0.055)	0.229*** (0.066)	0.165*** (0.053)
Control× N. OHS-treated	0.008 (0.019)	0.015 (0.015)	-0.011 (0.014)	0.043*** (0.016)	0.023* (0.014)
Control× N. OHS+Biz-treated	0.007 (0.021)	0.005 (0.027)	-0.001 (0.031)	-0.009 (0.034)	-0.034 (0.024)
N. firms in MC	-0.002 (0.004)	0.008 (0.006)	0.002 (0.006)	-0.000 (0.007)	0.005 (0.004)
Observations	3,963	3,963	3,963	1,950	3,963

*Notes:* Each column is a separate regression. “N. OHS-treated” refers to the number of firms within the MC that were in the OHS arm. “N. firms in MC” refers to the total number of light engineering firms in the MC. Regressions in cols. 1 and 2 use the ANCOVA specification. Regressions in cols. 3-5 use simple linear regressions without controlling for baseline values of the outcome variable, as the outcomes in these columns were not measured at baseline. Unit of observation is at the firm-wave level. “Life attitude index” (col. 4) is only measured at endline as questions regarding life attitude were only asked in the endline survey. Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## Appendix 9 Heterogeneous Effects by Baseline Characteristics

Table A9.1 presents heterogeneous effects by owners' baseline education (Panel A) and age (Panel B). We separate owners into two education groups by the median level of education at baseline (8th grade or middle school graduation) and two age groups by the median age at baseline (38). When we examine the effects on firm practices, employment, output, investment, and productivity (cols. 1-5), there is no significant heterogeneity by either education or age.

However, when we examine the effects on firm owners' business attitudes and life attitudes (cols. 8-9), the interaction terms between OHS treatment and more educated owners are large, *negative*, and statistically significant; the interaction terms between OHS+Biz and the more educated owners are also large and *negative*, albeit only significant at the 10% level. The results show that both interventions significantly improved the business and life attitudes of *less* educated firm owners, but had no impact on the attitudes of more educated owners. These results suggest that the more educated firm owners may have already picked up positive business and life attitudes through other channels (such as formal schooling); OHS and business training may be a substitute for formal education in instilling positive business and life attitudes.

Similarly, the interaction terms between the OHS treatment and the older owners dummy are large, *positive*, and statistically significant; the interaction terms between OHS+Biz and the older owners dummy are also large and *positive*, although only significant at the 10% level. The results show that both interventions significantly improved the business and life attitudes of older firm owners, but had no or small impact on the attitudes of younger owners. As older owners in the control group had more negative attitudes than their younger counterparts, the OHS and business training effectively closed the attitude gap between older and younger owners.

Table A9.2 presents heterogeneous effects by baseline employment (Panel A) and business practices (Panel B). We separate firms into high or low employment by the median employment at baseline (which is 4, or owner plus 3 hired workers) and good or bad practices by the median business practices score at baseline (which is 0.56, or implementing 56% of best practices). There is no significant heterogeneity by firm practices on any of the outcomes (Panel B). There is no significant heterogeneity by employment when we examine the effects on firm practices, employment, output, investment, and productivity (cols. 1-5). The effects of the OHS intervention on market linkages are *larger* on high-employment firms, with the interaction term between OHS treatment and high employment being sizeable and statistically significant at the 10% level (col. 7). In contrast, the effects of the OHS intervention on firm owners' management skills are *smaller* on the high-employment firms, with the interaction term being negative and statistically significant at the 10% level.

Table A9.3 presents heterogeneous effects by baseline sales (Panel A) and profits. We separate firms into high or low sales (profits) by the median monthly sales (profits) at baseline. There is no significant heterogeneity by profits or sales, except in one case: The effects of the OHS intervention on market linkages are *larger* on firms with higher sales; the interaction term between OHS treatment and high sales is large and statistically significant.

Table A9.1: Heterogeneous Effects by Firm Owner Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Overall Business Practices	Employ- ment Index	Aggregate Output Index	Value of Equip- ment	Productivity Residual	Financial Linkage Index	Market Linkage Index	Business Attitude Index	Life Attitude Index	Mgmt. Skills Index
<i>Panel A: By firm owner's educational attainment at baseline (More edu. = Completed middle school, i.e., 8th grade)</i>										
OHS [1]	0.049*** (0.008)	0.028 (0.048)	0.122* (0.065)	0.045 (0.054)	0.058 (0.049)	0.009 (0.054)	0.232*** (0.064)	0.149* (0.079)	0.207*** (0.076)	0.229*** (0.060)
OHS × More edu. [2]	0.007 (0.009)	0.036 (0.068)	0.042 (0.091)	-0.104 (0.085)	0.025 (0.060)	-0.024 (0.073)	0.018 (0.083)	-0.175** (0.082)	-0.271** (0.110)	-0.049 (0.066)
OHS+Biz [3]	0.052*** (0.007)	0.102** (0.044)	0.087 (0.059)	0.020 (0.061)	0.027 (0.043)	0.029 (0.055)	0.144** (0.064)	0.115* (0.064)	0.297*** (0.080)	0.137** (0.062)
OHS+Biz × More edu. [4]	0.012 (0.009)	-0.058 (0.066)	0.047 (0.084)	0.134* (0.081)	-0.024 (0.060)	-0.003 (0.087)	0.084 (0.084)	-0.063 (0.079)	-0.199* (0.105)	0.050 (0.073)
More edu.	0.017*** (0.005)	0.073** (0.036)	0.168*** (0.049)	0.083* (0.049)	0.105*** (0.032)	0.122*** (0.044)	0.122*** (0.044)	0.122*** (0.044)	0.132** (0.064)	0.223*** (0.041)
P-value: [1]+[2]=0	0.000	0.192	0.031	0.390	0.109	0.783	0.000	0.709	0.470	0.001
P-value: [3]+[4]=0	0.000	0.435	0.056	0.011	0.954	0.704	0.002	0.439	0.228	0.002
<i>Panel B: By firm owner's age at baseline (Older = Above the median age of 38)</i>										
OHS [1]	0.053*** (0.007)	0.078 (0.049)	0.175*** (0.066)	-0.055 (0.054)	0.047 (0.047)	-0.036 (0.055)	0.283*** (0.063)	-0.063 (0.068)	-0.017 (0.077)	0.148*** (0.056)
OHS × Older [2]	0.001 (0.009)	-0.072 (0.067)	-0.063 (0.086)	0.108 (0.083)	0.056 (0.062)	0.073 (0.077)	-0.085 (0.080)	0.274*** (0.083)	0.200* (0.113)	0.134* (0.074)
OHS+Biz [3]	0.058*** (0.006)	0.088* (0.051)	0.134** (0.061)	0.056 (0.061)	-0.001 (0.042)	0.051 (0.061)	0.161** (0.068)	0.016 (0.065)	0.145* (0.078)	0.102* (0.060)
OHS+Biz × Older [4]	0.001 (0.009)	-0.032 (0.066)	-0.051 (0.083)	0.060 (0.085)	0.036 (0.058)	-0.053 (0.081)	0.052 (0.080)	0.146* (0.088)	0.122 (0.108)	0.132 (0.083)
Older	-0.009* (0.005)	-0.064* (0.038)	-0.043 (0.049)	-0.080* (0.048)	-0.042 (0.032)	-0.167*** (0.042)	0.013 (0.043)	-0.180*** (0.048)	-0.093 (0.064)	-0.058 (0.049)
P-value: [1]+[2]=0	0.000	0.895	0.118	0.443	0.062	0.522	0.003	0.010	0.048	0.000
P-value: [3]+[4]=0	0.000	0.258	0.218	0.076	0.479	0.972	0.002	0.025	0.002	0.001

*Notes:* Each column in each panel is a separate regression pooling midline and endline data. Regressions in cols. 1-9 control for the baseline value of the outcome variable. Unit of observation is at the firm-wave level. **Number of observation is N = 1,950 in col. 9 and N = 3,963 in all other columns.** Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A9.2: Heterogeneous Effects by Baseline Employment and Business Practices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Overall	Employ-	Aggregate	Value of		Financial	Market	Business	Life	Mgmt.
	Business	ment	Output	Equip-	Productivity	Linkage	Linkage	Attitude	Attitude	Skills
	Practices	Index	Index	ment	Residual	Index	Index	Index	Index	Index
<i>Panel A: By baseline <b>employment</b> size (High employment = Above median employment, i.e., baseline total employment <math>\geq 4</math>)</i>										
OHS [1]	0.054*** (0.007)	0.056 (0.042)	0.118** (0.057)	0.016 (0.056)	0.091* (0.046)	-0.054 (0.053)	0.165*** (0.063)	0.034 (0.072)	0.064 (0.093)	0.273*** (0.058)
OHS $\times$ High employment [2]	-0.004 (0.009)	-0.017 (0.065)	0.045 (0.086)	-0.044 (0.083)	-0.043 (0.061)	0.101 (0.074)	0.147* (0.083)	0.060 (0.080)	0.015 (0.112)	-0.134* (0.073)
OHS+Biz [3]	0.059*** (0.006)	0.068 (0.046)	0.088 (0.054)	0.098* (0.058)	0.043 (0.041)	-0.046 (0.057)	0.167** (0.070)	0.102 (0.066)	0.250*** (0.086)	0.157** (0.063)
OHS+Biz $\times$ High employment [4]	-0.008 (0.008)	0.010 (0.075)	-0.004 (0.079)	-0.034 (0.088)	-0.066 (0.059)	0.128 (0.085)	0.011 (0.086)	-0.035 (0.084)	-0.108 (0.106)	-0.001 (0.078)
High employment	0.048*** (0.005)	0.052 (0.068)	0.563*** (0.047)	0.250*** (0.050)	0.200*** (0.034)	0.238*** (0.043)	0.279*** (0.048)	0.043 (0.048)	0.206*** (0.063)	0.182*** (0.045)
P-value: [1]+[2]=0	0.000	0.456	0.030	0.667	0.372	0.397	0.000	0.213	0.278	0.020
P-value: [3]+[4]=0	0.000	0.184	0.196	0.354	0.638	0.187	0.011	0.325	0.059	0.011
<i>Panel B: By baseline <b>business practices</b> score (Good practices = Baseline business practices score above median)</i>										
OHS [1]	0.059*** (0.007)	0.097** (0.047)	0.173** (0.067)	0.039 (0.061)	0.035 (0.048)	-0.024 (0.059)	0.283*** (0.065)	0.031 (0.074)	0.107 (0.083)	0.268*** (0.065)
OHS $\times$ Good practices [2]	-0.010 (0.009)	-0.088 (0.064)	-0.031 (0.090)	-0.066 (0.082)	0.080 (0.058)	0.050 (0.082)	-0.065 (0.086)	0.066 (0.088)	-0.054 (0.118)	-0.100 (0.082)
OHS+Biz [3]	0.061*** (0.007)	0.094** (0.048)	0.130* (0.067)	0.060 (0.065)	0.030 (0.045)	0.029 (0.064)	0.229*** (0.079)	0.135* (0.077)	0.196** (0.085)	0.205*** (0.073)
OHS+Biz $\times$ Good practices [4]	-0.006 (0.009)	-0.031 (0.068)	-0.021 (0.089)	0.067 (0.083)	-0.020 (0.059)	0.004 (0.091)	-0.074 (0.099)	-0.096 (0.090)	0.019 (0.106)	-0.068 (0.091)
Good practices	0.003 (0.007)	0.119*** (0.040)	0.304*** (0.050)	0.236*** (0.050)	0.105*** (0.033)	0.086* (0.046)	0.189*** (0.051)	-0.016 (0.051)	0.092 (0.065)	0.220*** (0.057)
P-value: [1]+[2]=0	0.000	0.845	0.050	0.652	0.018	0.634	0.002	0.215	0.556	0.004
P-value: [3]+[4]=0	0.000	0.235	0.097	0.025	0.839	0.606	0.028	0.523	0.006	0.023

*Notes:* Each column in each panel is a separate regression pooling midline and endline data. Regressions in cols. 1-9 control for the baseline value of the outcome variable. Unit of observation is at the firm-wave level. **Number of observation is N = 1,950 in col. 9 and N = 3,963 in all other columns.** Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



Table A9.3: Heterogeneous Effects by Baseline Sales and Profits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Overall Business Practices	Employ- ment Index	Aggregate Output Index	Value of Equip- ment	Productivity Residual	Financial Linkage Index	Market Linkage Index	Business Attitude Index	Life Attitude Index	Mgmt. Skills Index
<i>Panel A: By baseline sales</i> (High sales = Baseline monthly sales above median)										
OHS [1]	0.054*** (0.007)	0.048 (0.040)	0.128** (0.058)	0.024 (0.056)	0.088* (0.049)	-0.057 (0.059)	0.124* (0.065)	0.029 (0.069)	-0.001 (0.089)	0.246*** (0.059)
OHS × High sales [2]	-0.008 (0.009)	-0.014 (0.066)	-0.026 (0.085)	-0.093 (0.085)	-0.065 (0.061)	0.075 (0.086)	0.191** (0.085)	0.056 (0.081)	0.130 (0.115)	-0.102 (0.077)
OHS+Biz [3]	0.065*** (0.007)	0.044 (0.043)	0.133** (0.063)	0.122** (0.054)	0.033 (0.041)	0.007 (0.054)	0.225*** (0.066)	0.104 (0.065)	0.243*** (0.078)	0.200*** (0.061)
OHS+Biz × High sales [4]	-0.016* (0.009)	0.089 (0.073)	-0.036 (0.083)	-0.053 (0.087)	-0.030 (0.058)	0.068 (0.084)	-0.085 (0.088)	-0.040 (0.078)	-0.090 (0.108)	-0.075 (0.077)
High sales	0.044*** (0.005)	0.142*** (0.051)	0.525*** (0.057)	0.328*** (0.049)	0.236*** (0.034)	0.256*** (0.047)	0.273*** (0.047)	0.090** (0.042)	0.104 (0.066)	0.217*** (0.049)
P-value: [1]+[2]=0	0.000	0.529	0.166	0.291	0.647	0.757	0.000	0.273	0.112	0.019
P-value: [3]+[4]=0	0.000	0.031	0.140	0.351	0.955	0.252	0.071	0.325	0.074	0.048
<i>Panel B: By baseline profit</i> (High profit = Baseline monthly profit above median)										
OHS [1]	0.054*** (0.007)	0.043 (0.051)	0.156** (0.072)	-0.069 (0.065)	0.077 (0.053)	0.020 (0.063)	0.197*** (0.071)	0.073 (0.081)	0.016 (0.088)	0.162*** (0.058)
OHS × High profit [2]	-0.002 (0.009)	0.008 (0.068)	-0.016 (0.092)	0.126 (0.088)	-0.010 (0.064)	-0.043 (0.086)	0.088 (0.091)	-0.017 (0.087)	0.119 (0.115)	0.095 (0.075)
OHS+Biz [3]	0.062*** (0.007)	0.014 (0.046)	0.068 (0.069)	0.066 (0.053)	0.017 (0.049)	0.004 (0.060)	0.209*** (0.070)	0.102 (0.066)	0.227*** (0.085)	0.129** (0.063)
OHS+Biz × High profit [4]	-0.008 (0.009)	0.128* (0.068)	0.080 (0.084)	0.047 (0.084)	0.000 (0.059)	0.058 (0.083)	-0.043 (0.084)	-0.032 (0.083)	-0.056 (0.116)	0.069 (0.082)
High profit	0.002 (0.005)	0.024 (0.036)	-0.305*** (0.054)	0.092* (0.051)	0.050 (0.034)	0.116*** (0.043)	0.138*** (0.044)	0.064 (0.044)	-0.085 (0.063)	-0.074* (0.045)
P-value: [1]+[2]=0	0.000	0.268	0.043	0.350	0.175	0.674	0.000	0.430	0.101	0.000
P-value: [3]+[4]=0	0.000	0.010	0.013	0.111	0.678	0.299	0.018	0.296	0.043	0.002

*Notes:* Each column in each panel is a separate regression pooling midline and endline data. Regressions in cols. 1-9 control for the baseline value of the outcome variable. Unit of observation is at the firm-wave level. **Number of observation is N = 1,950 in col. 9 and N = 3,963 in all other columns.** Robust standard errors clustered at the market level are shown in parentheses. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## Appendix 10 Correction for Multiple Hypothesis Testing

Our main approach to dealing with multiple hypothesis testing is to aggregate outcomes in the same domain into an overall score or an aggregate index (such as the overall business practices score, the aggregate employment index, and the aggregate output index).

Here, we present sharpened false discovery rate (FDR) q-values using the method of Benjamini, Krieger, and Yekutieli (2006)<sup>28</sup> as described in Anderson (2008).<sup>29</sup> We first take the family of main outcomes in Tables 2, 3, and 4 and apply FDR corrections simultaneously for all tests performed in these tables. Given the 39 main outcomes and two treatment arms, there are 78 tests in total in these main tables. Appendix Table A10.1 reports the outcomes (from Tables 2-4) that have sharpened FDR q-values below 0.10. Among the **31** main outcomes with naive p-values below 0.05, **26** also have sharpened FDR q-values below 0.05, while the other 5 have sharpened FDR q-values between 0.053 and 0.083.

We then take the family of secondary outcomes in Tables 5 and 6 and apply FDR corrections simultaneously for all tests performed in these tables. Given the 21 secondary outcomes and two treatment arms, there are 42 tests in total. Appendix Table A10.2 reports the secondary outcomes (from Tables 5-6) that have sharpened FDR q-values below 0.10. Among the **5** secondary outcomes with naive p-values below 0.05, **all 5** also have sharpened FDR q-values below 0.05. All other (unreported) secondary outcomes have both naive p-values and sharpened FDR q-values above 0.10.

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<sup>28</sup>Benjamini, Y., A. M. Krieger, and D. Yekutieli (2006). Adaptive linear step-up procedures that control the false discovery rate. *Biometrika*, 93(3), 491–507.

<sup>29</sup>Anderson, M. L. (2008). Multiple inference and gender differences in the effects of early intervention: A reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects. *Journal of the American Statistical Association* 103(484), 1481–1495.

Table A10.1: Sharpened Q-values Below 0.10 for Main Effects from Tables 2 - 4

Table	Outcome	Treatment	P-value	Sharpened Q-value
Table 2	Safety Practices Score	OHS	0.0000	0.001
Table 2	Work Environment Score	OHS	0.0001	0.001
Table 2	Material Management Score	OHS	0.0210	0.048
Table 2	Account Practices Score	OHS	0.0000	0.001
Table 2	Overall Business Practices Score	OHS	0.0000	0.001
Table 2	Safety Knowledge Score	OHS	0.0000	0.001
Table 2	Safety Discussion Score	OHS	0.0000	0.001
Table 2	Workers' Rating of Work Envr.	OHS	0.0000	0.001
Table 2	Safety Practices Score	OHS+Biz	0.0000	0.001
Table 2	Work Environment Score	OHS+Biz	0.0000	0.001
Table 2	Fair Labor Practices Score	OHS+Biz	0.0002	0.001
Table 2	Material Management Score	OHS+Biz	0.0103	0.032
Table 2	Account Practices Score	OHS+Biz	0.0000	0.001
Table 2	Overall Business Practices Score	OHS+Biz	0.0000	0.001
Table 2	Safety Knowledge Score	OHS+Biz	0.0000	0.001
Table 2	Safety Discussion Score	OHS+Biz	0.0000	0.001
Table 2	Workers' Rating of Work Envr.	OHS+Biz	0.0000	0.001
Table 3	Total Monthly Salary (IHS)	OHS	0.0297	0.060
Table 3	Avg. Employment Last Year (level)	OHS+Biz	0.0320	0.063
Table 3	Avg. Employment Last Year (log)	OHS+Biz	0.0611	0.095
Table 3	Total Monthly Salary (level)	OHS+Biz	0.0536	0.088
Table 3	Aggregate Employment Index	OHS+Biz	0.0509	0.088
Table 4 Panel A	Annual Sales (IHS)	OHS	0.0098	0.032
Table 4 Panel A	Finished Goods Inventory (IHS)	OHS	0.0024	0.010
Table 4 Panel A	Aggregate Output Index (based on IHS)	OHS	0.0067	0.026
Table 4 Panel A	Productivity Residual (based on IHS)	OHS	0.0703	0.097
Table 4 Panel A	Annual Sales (IHS)	OHS+Biz	0.0385	0.072
Table 4 Panel A	Aggregate Output Index (based on IHS)	OHS+Biz	0.0255	0.053
Table 4 Panel A	Value of Equipment (IHS)	OHS+Biz	0.0675	0.097
Table 4 Panel B	Annual Sales (level)	OHS	0.0084	0.029
Table 4 Panel B	Monthly Sales (level)	OHS	0.0531	0.088
Table 4 Panel B	Finished Goods Inventory (level)	OHS	0.0122	0.035
Table 4 Panel B	Aggregate Output Index (based on level)	OHS	0.0073	0.026
Table 4 Panel B	Productivity Residual (based on level)	OHS	0.0698	0.097
Table 4 Panel B	Value of Equipment (level)	OHS+Biz	0.0157	0.039
Table 4 Panel C	Annual Sales (winsorized level)	OHS	0.0156	0.039
Table 4 Panel C	Finished Goods Inventory (winsorized level)	OHS	0.0152	0.039
Table 4 Panel C	Aggregate Output Index (based on winsorized level)	OHS	0.0622	0.095
Table 4 Panel C	Value of Equipment (winsorized level)	OHS+Biz	0.0466	0.083

*Notes:* Sharpened false discovery rate (FDR) q-values computed for all main effects presented in Tables 2 to 4, following the method of Benjamini, Krieger, and Yekutieli (2006) as outlined in Anderson (2008). This table reports the original naive p-values and the corresponding sharpened q-values for all main effects that have sharpened q-values below 0.10. All unreported effects from Tables 2 to 4 have original p-values greater than 0.07 and sharpened FDR q-values greater than 0.10.

Table A10.2: Sharpened Q-values Below 0.10 for Other Effects from Tables 6 - 7

Table	Outcome	Treatment	P-value	Sharpened Q-value
Table 6	Market Linkage Index	OHS	0.0000	0.001
Table 6	(Self-assessed) Management Skills Index	OHS	0.0000	0.001
Table 6	Market Linkage Index	OHS+Biz	0.0009	0.009
Table 6	Life Attitude Index	OHS+Biz	0.0010	0.009
Table 6	(Self-assessed) Management Skills Index	OHS+Biz	0.0009	0.009

*Notes:* Sharpened false discovery rate (FDR) q-values computed for all other effects presented in Tables 6 and 7, following the method of Benjamini, Krieger, and Yekutieli (2006) as outlined in Anderson (2008). This table reports the original naive p-values and the corresponding sharpened q-values for all main effects that have sharpened q-values below 0.10. All unreported effects from Tables 6 and 7 (including all effects from Table 7) have original p-values greater than 0.10 and sharpened FDR q-values greater than 0.10.