Impact Evaluation of the Better Work Supervisory Skills Training Program

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Abstract

The supervisory skills training program was implemented by Better Work country teams in Cambodia, Haiti, Indonesia, Jordan, Lesotho, Nicaragua, and Vietnam. The program was designed to be highly interactive and to teach supervisors about their roles and responsibilities, professional behavior at work, communicating effectively with workers, and improving worker performance, thus improving outcomes in three areas: supervisors' abilities and confidence at work, their relationships with workers, and productivity. Training had positive effects in all three of these areas (measured in terms of self-efficacy, attitudes toward workers, and productivity). Although there were some direct effects of training, including improved perspective-taking, reduced injury rates, and reduced time to production target, the effect was often moderated by other variables, like mindset or perceived power. Training was most effective for supervisors who believe that intelligence is not fixed, and therefore were presumably more open to learning new skills and more likely to persist when challenged; for supervisors who rejected the idea that improvements in working conditions necessarily reduce factory performance; for supervisors who perceived manager buy-in for training and thus likely felt supported in implementing what they learned; and for supervisors who felt moderately but not extremely powerful (i.e., not more powerful than their managers). Having moderate power may have been the key to being both open to learning new skills and confident enough to implement them on the factory floor.

Supervisory Skills Training Impact Evaluation

Supervisors play a key role in garment factories—not only overseeing the quality and quantity of work produced, but also shaping workers' experiences and serving as a link between workers and managers. Yet supervisors often have no formal training in management skills, and may struggle to motivate workers in an effective and humane way while dealing with pressure from managers to meet production quotas.

Program details and design

The supervisory skills training program was funded by Disney and implemented by Better Work country teams in Cambodia, Haiti, Indonesia, Jordan, Lesotho, Nicaragua, and Vietnam. It generally takes place over three or four days and is designed to be highly interactive, with small-group and large-group discussion, demonstrations, and multiple participatory exercises and role plays. For example, a session on listening skills involves a presentation of effective techniques by the trainer, a group discussion about how listening skills are currently used in the workplace, a brainstorming activity, a demonstration of effective listening by the facilitator, and finally, a role play in which supervisors pair up and take turns telling their partner about a current concern they have in their work or home life. After everyone has practiced listening to another person's concern, one pair is invited to repeat their role play for the entire group, then discuss what went well and what could be improved.

There is time allotted in every training day for practicing new skills and reviewing past lessons; in addition, supervisors are encouraged to apply what they have learned both at work and in their personal lives, and to start after the first training session, rather than waiting to try new skills once they have finished the program. At the end of each day of training, supervisors develop specific plans for applying their new skills, and discuss these efforts at the next session. At the conclusion of the training program, supervisors review the skills they have applied so far, and create a written action plan for applying their new skills in the future.

By the end of the program, supervisors should have learned about their roles and responsibilities, professional behavior at work, communicating effectively with workers, and improving worker performance. All of the modules were intended to improve supervisors' relationships with workers and (either directly or through these improved relationships) to improve productivity. The impact evaluation was designed to measure improvements in all of these areas (measures are described in greater detail below, in the Measures section).

First, the training focuses on identifying supervisory roles and responsibilities, and learning about positive and professional leadership and communication styles—e.g., finding the right balance between aggressive and passive behavior. Participants also learn that their power as supervisors comes from their ability to motivate workers, and that they will be more successful if they set a good example and build relationships with their workers, rather than trying to force workers to follow orders. We examined whether learning more positive leadership styles and motivational techniques changed supervisors' perceptions of and attitudes toward workers (e.g., were supervisors less likely to dehumanize workers—to believe that workers respond more to threats than encouragement?).

Second, the training addresses time management skills—e.g., setting aside time to plan and organize tasks rather than allowing crises to develop. Supervisors learn that extending work time does not necessarily extend productivity—eventually, people become overtired and productivity

drops. We measured overall productivity in several ways (e.g., injury rate, defect rate, and time needed to reach the production target) to determine whether supervisors were able to use these skills to improve the productivity of their line.

Third, supervisors learn about building positive relationships with workers. They learn that even when another person is being difficult, it is worthwhile to try to understand that person rather than becoming angry with them. In addition, the training encourages supervisors to show both concern for tasks and concern for people and identify overlapping worker and factory goals. Workers' rights are discussed as ensuring not only workers' wellbeing but also factory productivity. Supervisors also learn how to listen well and take workers' perspectives. We measured whether this training affected supervisors' attempts to take the perspective of workers, interest in understanding workers as individuals, beliefs about the importance of safe working conditions, and sense of outcome dependence (i.e., the belief that worker and supervisor outcomes are linked—described below).

Finally, trainers demonstrate how to effectively assign jobs to workers (e.g., to relieve a bottleneck in a production line), and how to properly instruct workers on new tasks, and have supervisors practice these skills in small groups. We measured training effects on line balancing and other measures of productivity to determine whether these skills were put to use.

In sum, the training program covered both production-specific skills and leadership and communication skills. The impact evaluation measured whether receiving training improved supervisors' confidence in their ability to do their jobs (as would be expected from learning new skills in a supportive environment), their attitudes toward workers (as expected from learning leadership and communication skills), and the productivity of their lines (as expected from learning leadership, communication, and production-specific skills).

Theory of change

If successful, the supervisory skills training program should both improve supervisors' perceptions of workers and give them the skills they need to act on those improved perceptions. Ideally, improved attitudes and behavior toward workers are accompanied by greater supervisor confidence, and greater productivity and reduced turnover among workers.

A number of moderating factors could prevent improved attitudes and new skills from translating into improved behavior—for example, cognitive load, or the amount of stress and time pressure experienced by supervisors, and managers' support for the training. New skills need to be practiced, and this takes some mental effort, which is likely to be difficult for supervisors at the edge of their mental capacity because of a high workload or time pressure. Supervisors who learn new skills and have the mental space to put them into practice may avoid doing that if they sense discouragement from managers. These and other potential moderators are discussed below, in the Measures section.

Theoretical background

Social psychological theory informed the design of the impact evaluation—the first known example of this approach in the supervisory skills training literature. Social psychology is the study of how social situations influence behavior. The field was influenced in large part by a desire to understand the causes of the Holocaust and racial prejudice in the United States; as a result, much social psychological research has focused on understanding and improving the way the powerful treat those with less power. Because of this emphasis, and because the field's

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methods are designed to measure the underlying causes of human behavior, social psychology adds an important layer to the traditional study of factory working conditions.

Much of the existing research on factories has taken a purely economic approach, in which the causes of human behavior are seen as a "black box"—i.e., unknown and perhaps unknowable. In this approach, people are assumed to start with a certain set of goals and information, and a certain set of constraints. Through some process (the black box) they decide how to act on those goals and information, and the result is their observable behavior. This process is assumed to be rational, and the resulting behavior is therefore assumed to be optimizing. In this model, a training program intervenes by shifting goals and adding information, and participants act on these new goals and information rationally. Improving working conditions involves shifting goals and information, and then simply measuring the resulting behavior.

Social psychology changes this approach by opening the black box, to get a better sense of what processes are really playing a role in the transition from goals and information to behavior. For example, if harsh working conditions persist even in the face of information that these conditions harm productivity, then the processes in the black box may not be entirely rational. Fortunately, that does not mean that these processes are unpredictable, if we pay attention to the experimental evidence on how they work. By taking a social psychological approach, we expand what we can measure, examining not just behavior but the process that leads to that behavior—and this creates many more places to identify impact, and to determine where to make adjustments.

Study design

The impact evaluation was designed as a randomized controlled trial, with three rounds of data collection. The baseline data collection occurred between June 2014 and March 2015, as each country team worked with participating factories and the local data collection partner to determine a convenient time. Following the first data collection, Tufts randomly assigned the supervisors queued for training to be trained immediately (in the first group), or a few months later (in the second group). Supervisors were not always trained in the assigned group; however, the analyses account for any disparities between actual and assigned group. Specifically, we created a group_match variable, set to one if the supervisor was in the assigned group and zero if the supervisor was not in the assigned group. This variable was included in all analyses, but was not significant, indicating that supervisors who were not in their randomly assigned groups did not significantly differ from those who were.

After the first group was trained, the local data collection partner returned to the factories to administer the midline survey to the same participants. Midline surveys took place between December 2014 and July 2015. Next, the second group of supervisors received training. Once training for this group was complete, the endline survey was administered to the same participants, between August 2015 and November 2015.

The effect of training was measured by creating two variables—one to indicate whether supervisors had recently completed training (i.e., supervisors in the first group surveyed at the midline, or supervisors in the second group surveyed at the endline) and one to indicate whether supervisors had received training several months prior (i.e., supervisors in the first group surveyed at the endline). In each case, those who had completed training in the given time frame were compared to all others, and both variables were included in every analysis. Examining the training effect at two different time points allows us to determine whether the effects decay (i.e., become weaker over time) or cure (i.e., strengthen over time).

Method

Local data collection partners in each country worked with the Better Work teams and the factories to arrange a date for each data collection. Better Work training officers provided lists of supervisors to survey (i.e., those who were participating in training), and Tufts assigned PINs to those supervisors. When supervisors arrived in the factory room set aside for the survey, a member of the local research team found their name on the PIN list and handed them a card with their PIN. They sat down with a tablet computer and headphones, and first completed a brief training programmed into the survey, to learn how to use the tablet computer and how to complete the survey. All instructions, survey questions, and response options were translated into the local language and audio recorded by a native speaker to aid any low-literacy participants. Research team members were nearby to answer any questions, but were asked not to interpret or suggest answers to survey items. After consenting to participate, and entering their PIN, supervisors completed the survey on their own, and then returned to work.

Participant characteristics

The figures below illustrate the demographics of the sample.
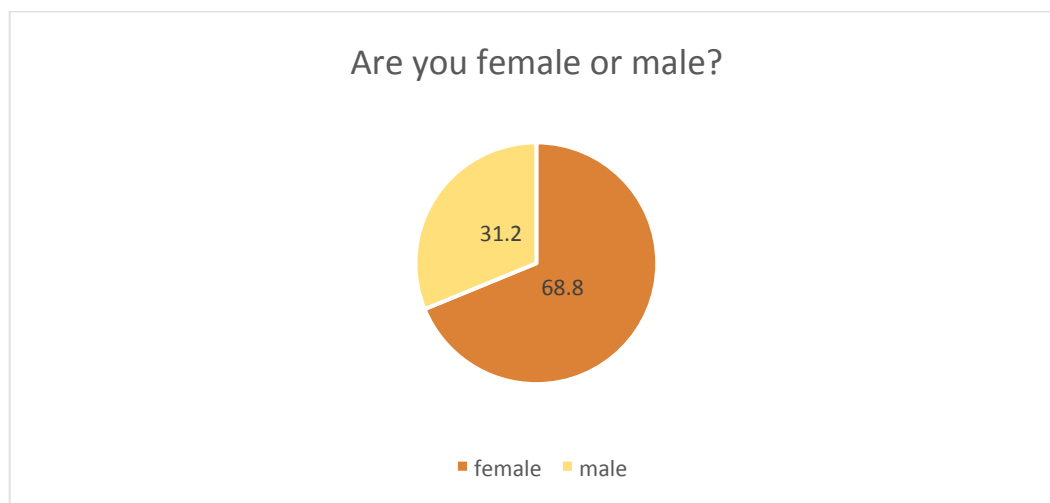
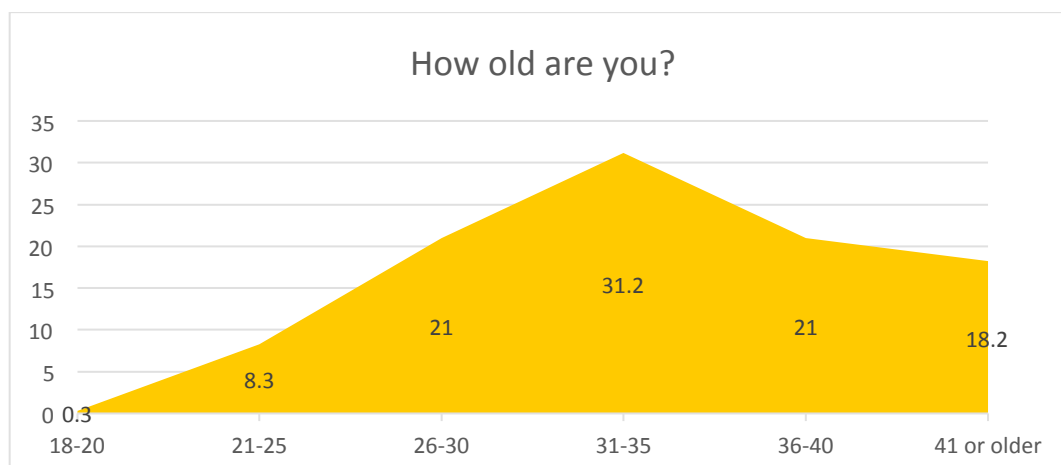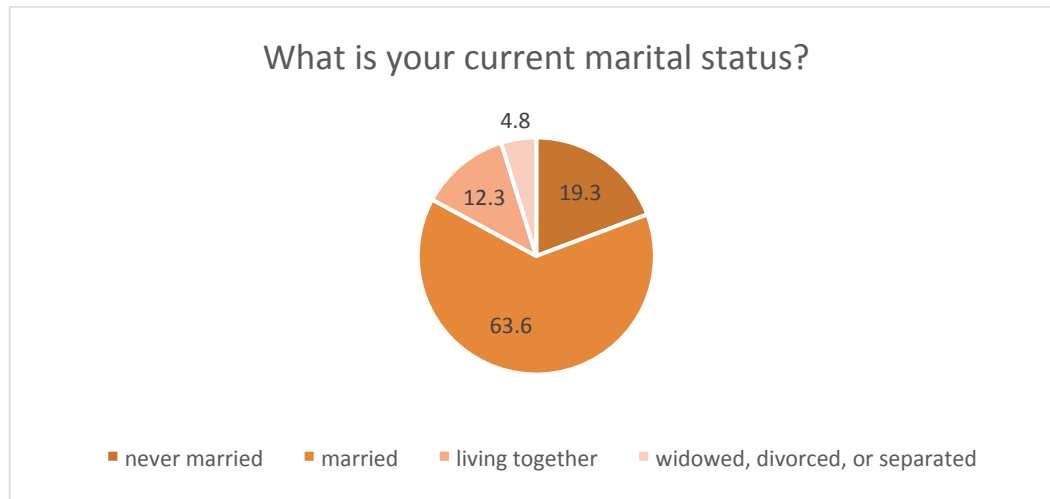Figure 1. Gender.

Figure 2. Age.

Figure 3. Marital status.

What is your current marital status?

4.8
12.3
19.3
63.6

■ never married ■ married ■ living together ■ widowed, divorced, or separated

Figure 4. Number of children.

How many children do you have?

no children	1 child	2 children	3 children	4 children	5 children	6 or more chldren
23.3	29.2	35.2	8.7	1.9	1.2	0.5
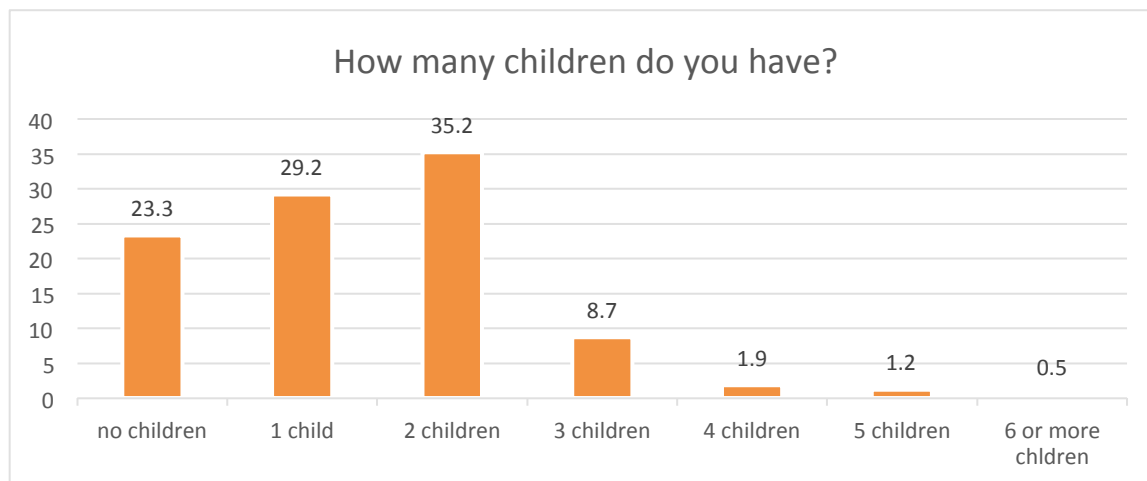
Figure 5. Type of residence.

Where do you reside? Please select all that apply.

with my family | in a place that I rent | in a house that I own | in a factory dormitory | with friends or coworkers outside the factory | other
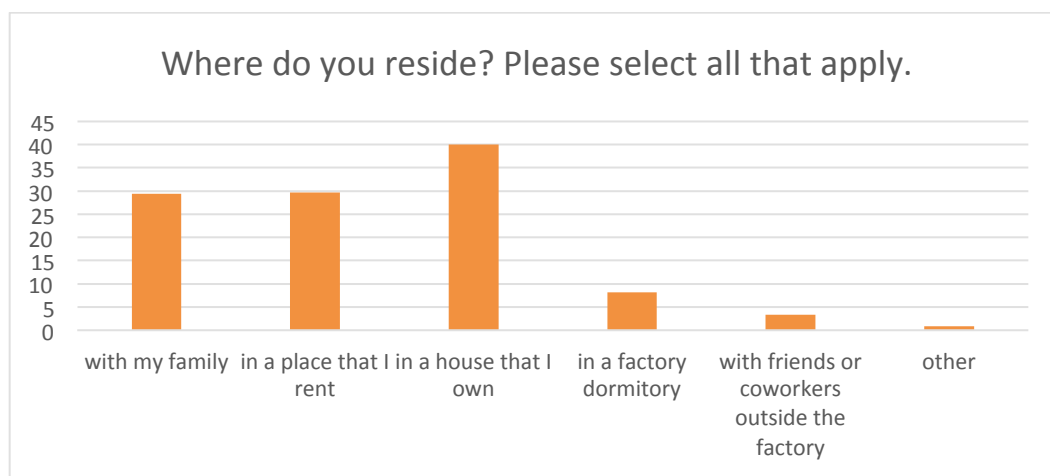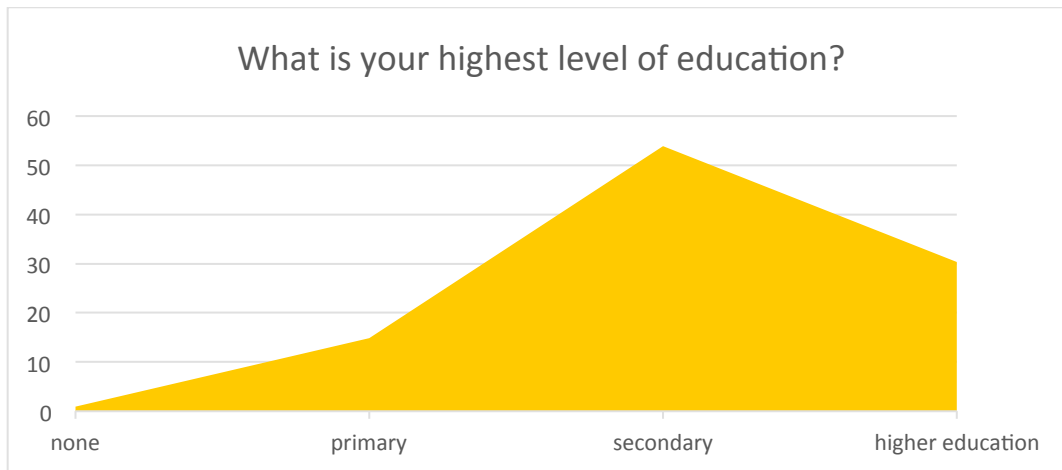
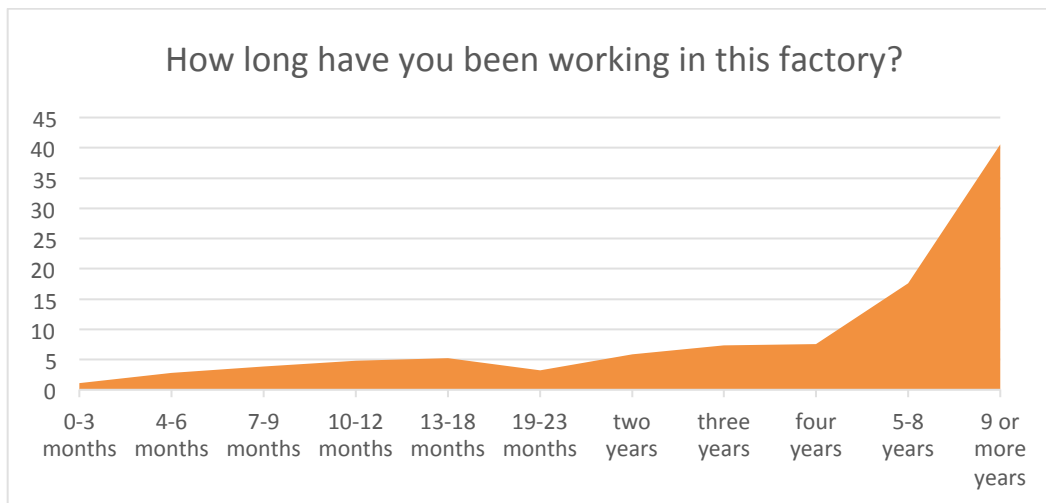Figure 6. Education.

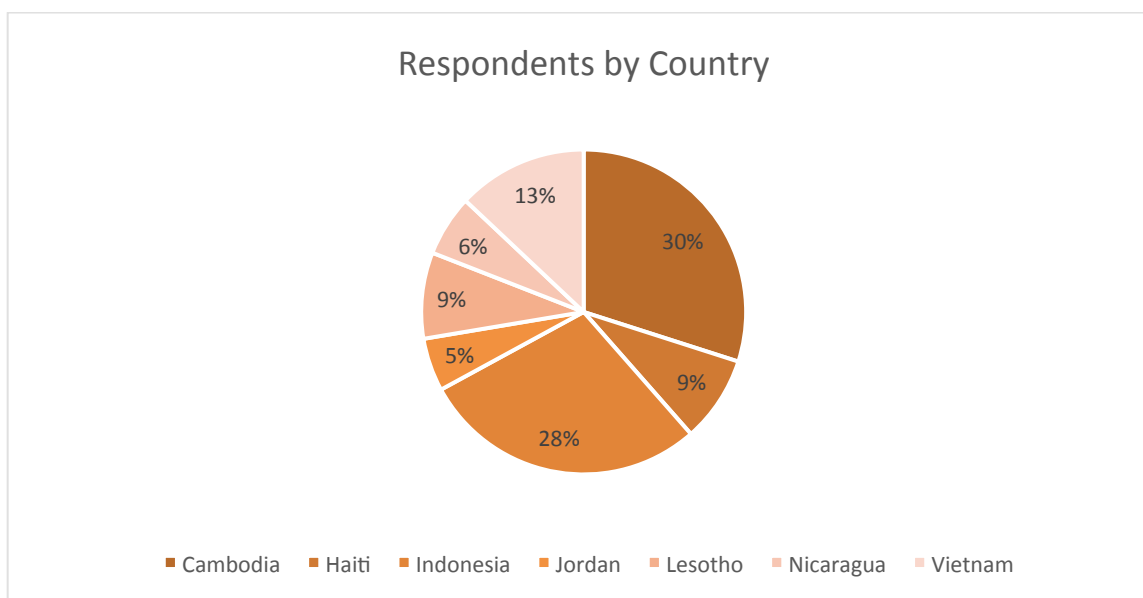Figure 7. Years in factory.

Figure 8. Country.

Table 1. Number of observations per country.

	Participants at baseline	Participants at midline	Participants at endline	Total observations
Cambodia	166	168	161	525
Haiti	71	40	39	150
Indonesia	210	165	125	500
Jordan	37	28	27	92
Lesotho	103	17	30	150
Nicaragua	59	42	6	107
Vietnam	130	58	39	227
Totals	776	518	427	1751

Measures

To determine the effect of training, we looked at three main areas of change: self-efficacy, attitudes toward workers, and productivity. Each is described below. We also examined factors that might alter how the training affected supervisors—these potential moderators of the training effect are also described below.

Self-efficacy

Self-efficacy is simply a belief in one's own capability (Bandura, 1997). It is distinct from self-esteem, which is feeling good about the self, and refers instead to confidence in one's ability to achieve important goals. Self-efficacy is a good predictor of job satisfaction and performance, health outcomes, and academic achievement (Holden, 1991; Judge & Bono, 2001; Multon, Brown, & Lent, 1991). Training meant to improve supervisors' skills should also increase their confidence in their ability to do their job well. To measure self-efficacy, we asked supervisors how much they agreed or disagreed with the following statements (adapted from Chen, Gully, & Eden, 2001):

- "In general, I think that I can achieve outcomes that are important to me at work."
- "Even when things are tough, I can perform quite well as a supervisor."
- "I feel that I have the skills and resources I need to be a good supervisor."
- "I believe I can successfully motivate the workers I supervise."

Supervisors responded using a five-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*). We combined these items into a composite measure of self-efficacy by averaging them (alpha = .67).

Attitudes toward workers

Harsh treatment of workers is not uncommon in factories, yet it is difficult to mistreat others whom we see as fully human individuals. Does supervisory skills training reduce supervisors' ability to justify mistreatment (though dehumanization), and does it increase the processes that make fair treatment more likely (e.g., individuation, humanization, perspective-taking)?

Individuation. Individuation refers to seeing others as individuals rather than interchangeable or stereotyped members of a group. Supervisors who individuate their workers are more likely to recognize their individual capabilities, preferences, and needs. We measured individuation with a single item, "I regularly ask the workers I supervise about their lives outside of work." Supervisors responded using a five-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*).

Dehumanization and humanization. Dehumanization refers to seeing others as less than fully human—e.g., viewing workers as little more than cogs in a machine. Dehumanization is more likely when people in power feel obligated to make decisions that harm their subordinates; for example, in one study participants who were given the role of a surgeon (versus a less powerful nurse) were more likely to choose a highly effective but painful procedure for their hypothetical patient (versus a painless but less effective procedure). Having chosen the painful procedure, participants then justified that choice by downplaying the patient's ability to feel pain (Lammers & Stapel, 2011).

Importantly, other research shows that once subordinates have been dehumanized, supervisors are less likely to process the consequences of harsh treatment, instead doubling down on behavior that negatively affects performance (Bandura, Underwood, & Fromson, 1975). Participants who had a position of power and the ability to punish others were more aggressive toward dehumanized others (but not toward humanized or neutral individuals), potentially because more refined techniques are not believed to influence those who are subhuman. Participants believed they were administering shocks to other participants as punishment for poor performance (in reality, no one received shocks). When their subordinates had been described in a dehumanized way (i.e., as animalistic), participants delivered more severe shocks, and reported more self-absolving justifications for their behavior (e.g., "It gets more efficiency out of the group;" "In many cases poor performance is indicative of laziness and a willingness to test the supervisor"). In addition, when punishment was followed by continuing poor performance, indicating that this was not an effective strategy, participants *escalated* the severity of shock delivered to dehumanized individuals (but not to humanized or neutral individuals).

In sum, these experiments show that simply granting power to individuals (even temporarily, and within the artificial confines of a psychology experiment) is sufficient to create dehumanization and mistreatment. In the factory context, supervisors who feel that they have to inflict harm may dehumanize workers. Once workers have been dehumanized, it's easier to continue harsh treatment. Furthermore, supervisors may not even be processing evidence that harsh working conditions are ineffective.

Supervisory skills training should reduce the number of decisions that inflict harm and require justification: Supervisors who understand how to motivate workers without resorting to yelling or threatening are less likely to have to justify their behavior by dehumanizing workers.

Humanization is simply seeing others as human, and can be accomplished by even basic perspective-taking exercises. In one brain imaging study, researchers found that dehumanized others (e.g., drug addicts and homeless people) were processed in the brain as objects rather than people (Harris & Fiske, 2006)—but asking participants to imagine whether, for example, a given homeless man liked or disliked broccoli shifted processing

to the social part of the brain (Harris & Fiske, 2007). In other words, although it is easy to dehumanize others, it can also be easy to rehumanize them.

We measured dehumanization with two items: "The workers I supervise respond better to threats than encouragement," and "The workers I supervise will not work hard unless they are forced to." These items were averaged to form one composite measure (alpha = .58). We measured humanization with two items: "The workers I supervise are more productive if they feel comfortable and safe at work," and "Happy workers are more productive than unhappy workers." These items were averaged to form one composite measure (alpha = .54), which was statistically distinct from the dehumanization measure. Supervisors responded to all of these items using a five-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*).

Perspective-taking. Perspective-taking (taking another's point of view) improves social functioning by increasing cooperation and the ability to reach mutually beneficial outcomes (Galinsky, Maddux, Gilin, & White, 2008). We measured supervisors' tendency to try to take the perspective of their workers with two items (from Davis, 1980), which we averaged to form a single composite (alpha = .42): "Before criticizing workers, I try to imagine how I would feel if I were in their place," and "I sometimes try to understand my workers better by imagining how things look from their perspective." Supervisors responded using a five-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*).

Outcome dependence. Outcome dependence is similar to the economic concept of aligned incentives. When leaders' outcomes depend on their subordinates, they are more motivated to pay attention to their subordinates' individual strengths and less likely to rely on stereotypes (Vescio, Snyder, & Butz, 2003). We measured outcome dependence with two items, averaged to form a composite measure (alpha = .70): "If my workers are happy, things will go better for me," and "Ensuring that workers have good working conditions helps me to achieve my goals." Supervisors responded using a five-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*).

Beliefs about working conditions. We were also interested in whether training affected supervisors' beliefs about the importance of safe and comfortable working conditions. We measured these beliefs with a single item, "According to my own beliefs, it's important that workers have safe and comfortable working conditions." Supervisors responded using a five-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*).

Productivity

Line balancing. Well-balanced lines with a smooth flow of work indicate greater productivity. We measured how well supervisors' lines were balanced with two items: "How often during the day do you notice work piling up at work stations?" and "How often during the day do you notice workers sitting idle waiting for work?" Supervisors responded using a five-point scale (1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *always*).

Time to reach target. We asked supervisors who had hourly production targets how long it usually took their workers to reach the target on the last full work day. We adjusted these times based on the extent to which the size of the production target changed over time. For example, if a supervisor reported that her line met a target of 200 pieces in 45 minutes at the baseline and a target of 250 pieces in 50 minutes at the midline, she actually presided over an increase in productivity, not a decrease.

Injury rate. To determine the injury rate, we asked each supervisor how many workers she supervises, and how many of those workers were injured in the last month. The number of injured workers divided by the number of workers supervised gave us the injury rate.

Defect rate. To measure the defect rate, we asked supervisors "What is the defect/reject rate for the workers you supervise?"

Turnover rate. We also asked supervisors how many of their workers had left the factory in the last month, and divided this number by the total number of workers they supervised to determine each supervisor's turnover rate. We also performed a survival analysis to determine whether having been trained made supervisors more likely to remain in the data set (and thus presumably less likely to have left the factory).

Potential moderators

Manager buy-in. As discussed above, it could be difficult for supervisors to implement new skills learned in training if they do not perceive support from their managers. Supervisors who embrace training but believe managers want to stick to the old ways are less likely to show training effects. To measure manager support for training, or buy-in, we asked supervisors to respond to the statement "The managers in this factory believe that supervisory skills training is valuable and worthwhile" using a five-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*).

Cognitive load. Cognitive load refers to the state of being mentally overwhelmed due to time pressure or trying to keep track of too many things at once. A famous social psychological study showed that helpful behavior is not determined solely by character or training, but by situational factors like time pressure. Theological seminary students who were asked to think either about the Good Samaritan parable (in which a man stops to help someone who is sick and struggling on the side of the road) or about an unrelated topic passed by a sick man; the researchers were interested in how many stopped to help (Darley & Batson, 1973). One might expect that all or most participants would stop, because they are seminary students and therefore should be more compassionate than the average person. Or one might think that at the very least, the participants who had just been asked to think about the Good Samaritan parable would stop—after all, they had essentially been given a script for how to behave in this situation. Yet the only thing that actually made a difference was how much of a hurry the participant was in. Of those who were under no time pressure, 63% stopped to help. When under moderate time pressure, 43% stopped to help. And when under a lot of time pressure, only 10% stopped to help.

Importantly, being reminded of the right thing to do was not enough to overcome the effects of time pressure—those who were asked to think about the Good Samaritan

parable as they walked were no more likely to stop. Being the type of person who seeks out religious training—and thus is presumably more concerned with doing the right thing—also did not guarantee a response. This research illustrates a key lesson from social psychology: Although we tend to assume that behavior is driven primarily by individual factors—i.e., what kind of person someone is—the power of the situation is often as important, if not more so.

In the factory context, this research suggests that supervisors under cognitive load are less likely to notice workers' distress, or to try to address it—and that training these supervisors will not necessarily make a difference in their behavior, just as the Good Samaritan parable did not affect whether participants stopped to help. Cognitive load also makes it difficult to process new or complex information, meaning that supervisors under cognitive load are less likely to be able to comprehend or act on new information from training. Thus, it is essential to understand how much cognitive load supervisors are under when evaluating training effects.

We measured cognitive load with two items, adapted from Ng, Ang, & Chan, 2008, and averaged to form a composite score (alpha = .59): "In the last three months, how often did difficult problems arise in your work for which there were no immediate solutions?" and "During a normal workweek, how frequently do unexpected issues arise in your work?" Supervisors responded using a five-point scale (1 = *once a week or less*, 2 = *a few times a week*, 3 = *almost every day*, 4 = *one to four times a day*, 5 = *five or more times a day*).

Fixed mindset. Some people believe that intelligence is fixed at birth, and that if someone is born with less intelligence there is not much that can be done to change that later in life. Those with this fixed mindset believe that failure indicates an innate lack of ability, and thus they avoid challenges, do not seek feedback, and give up more quickly. In contrast, people with a growth mindset believe that intelligence is not fixed but can grow over time; they are more likely to interpret failure as a sign that additional effort is needed, to seek out challenges and feedback, and to persist at difficult tasks (Dweck, 2006). Supervisors with a fixed mindset may be less affected by training because they become frustrated and give up too quickly when trying to learn new skills. We measured fixed mindset with two items (from Aronson, Fried, & Good, 2002), "You can learn new things, but you can't really change your basic intelligence" and "You have a certain amount of intelligence, and you can't really do much to change it," averaged to form a composite score (alpha = .68). Supervisors responded using a five-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*).

Supervisor, manager, and worker power. Power (defined as control over others' outcomes and resources) plays an important role in determining interpersonal dynamics. People who feel powerful are more likely to take action toward their goals; the type of goals they hold determine whether that action is beneficial or harmful to others (Galinsky, Gruenfeld, & Magee, 2003). Power makes dehumanization more likely in some circumstances (i.e., when taking action means harming others, and this decision needs to be justified; Lammers & Stapel, 2011), but can also lead to increased individuation if that serves the powerful person's goals. For example, participants who were asked to supervise the work of others paid more attention to the unique characteristics of their

subordinates when they had people-focused goals rather than production-focused goals (Overbeck & Park, 2006). Thus, power could either facilitate or block effects of training.

To measure the role of power in moderating effects of supervisor training, we presented supervisors with three ladders and these instructions (adapted from Adler, Epel, Castellazzo, & Ickovics, 2000): "Think of these ladders as representing how much power people have in this factory. At the top of the ladder are the people who have the most power and influence in the factory. At the bottom are the people who have the least power and influence. On the first ladder, please select the rung where you think you stand. On the second ladder, please select the rung where you think your workers stand. On the last ladder, please select the rung where you think your manager stands." Each rung corresponded to a number from 1 (least power) to 10 (most power). We then computed three measures of power: absolute power, or the supervisor's ranking of their own power in the factory, the manager/supervisor power gap (the supervisor's ranking of their manager's power minus their ranking of their own power), and the worker/supervisor power gap (the supervisor's ranking of their own power minus their ranking of their workers' power). Thus, if a supervisor picked a middle rung (equivalent to six) to represent their own power, the top rung (equivalent to ten) to represent their manager's power, and the bottom rung (equivalent to one) to represent workers' power, they would have a six as their absolute score, a four for their manager/supervisor gap score (ten minus six), and a five for their worker/supervisor gap score (six minus one). For ease of analysis, these scores were transformed by adding ten to each value, so that the resulting values were always positive (i.e., a -9 to 9 scale became 1 to 19, with a midpoint at 10 representing equal levels of power).

Zero-sum beliefs. Finally, we were interested in the moderating effect of supervisors' zero-sum beliefs about the relationship between factory performance and working conditions. If supervisors believe that there is a zero-sum relationship between conditions and performance, such that improving working conditions necessarily hurts performance, they may be less willing to apply lessons from training that emphasize better treatment of workers. We measured zero-sum beliefs with a single item, "When working conditions for workers improve, factory performance goes down."

A simple illustration of these potential training effects and moderators is below, in Figure 9.

Figure 9. A model of potential training effects. Each moderator is represented by a vertical bar; these bars are sized solely for ease of presentation. Vertical bars overlap the paths they could potentially affect; for example, manager buy-in and supervisor power could both affect the relationship between training and self-efficacy, productivity, and attitudes toward workers.
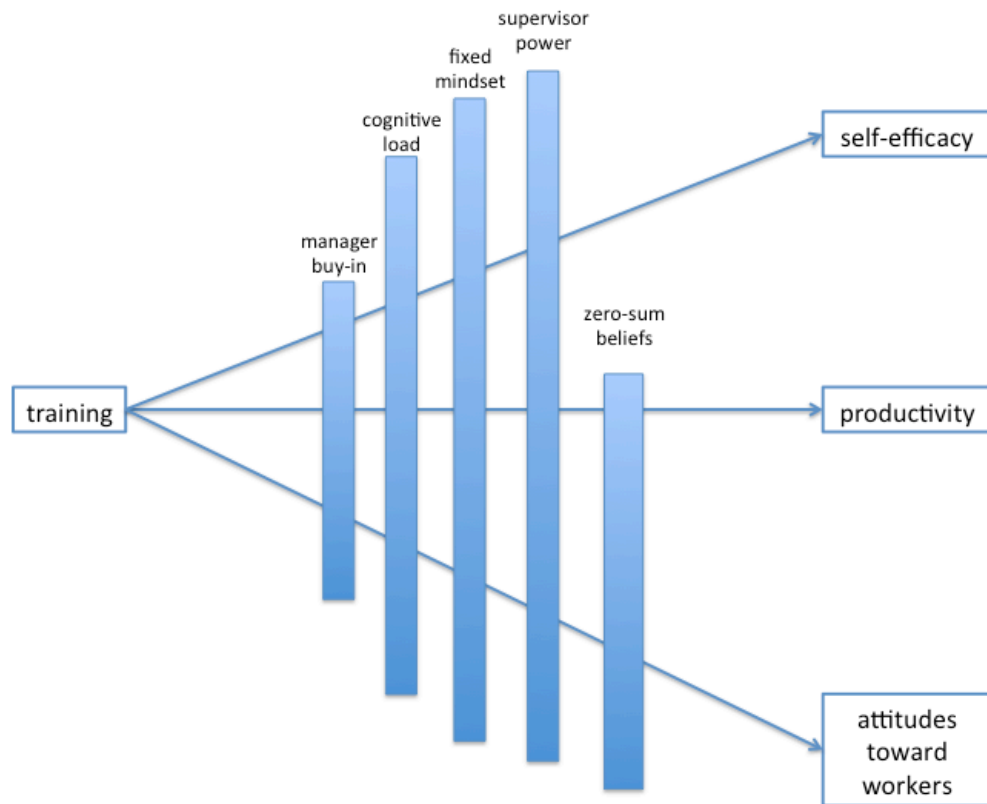
Results

All analyses controlled for gender, whether supervisors were trained in their assigned group, and country. Descriptive statistics for key variables are in the table below. Only the Work piling up variable was significantly different between the two groups at the baseline (using a Bonferroni correction for multiple comparisons).

Table 2. Descriptive statistics for key variables, including both groups at baseline, and overall values.

Item	Group 1 at Baseline				Group 2 at Baseline				Overall values			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Self-efficacy	4.07	0.43	2	5	4.08	0.45	2.5	5	4.07	0.43	1	5
Attitudes toward workers												
Dehumanization	2.24	0.87	1	5	2.35	0.99	1	5	2.32	0.93	1	5
Humanization	4.22	0.64	1	5	4.09	0.78	1	5	4.13	0.73	1	5
Outcome dependence	4.30	0.66	1	5	4.21	0.67	1	5	4.26	0.62	1	5
Individuation	3.25	1.06	1	5	3.18	1.11	1	5	3.19	1.09	1	5
Perspective-taking	3.89	0.68	2	5	3.83	0.66	2	5	3.89	0.65	1	5
Personal beliefs about working conditions	4.49	0.59	1	5	4.40	0.60	1	5	4.42	0.58	1	5
Productivity												
Turnover	.051	0.15	0	1	.070	0.18	0	1	0.05	0.13	0	1
Defect rate	5.22	10.50	0	87	7.25	14.48	0	80	6.28	12.81	0	100
How often during the day do you notice work piling up at work stations?*	2.94	1.31	1	5	2.52	1.19	1	5	2.69	1.21	1	5
How often during the day do you notice workers sitting idle waiting for work?	1.93	1.00	1	5	1.98	1.03	1	5	1.93	1.00	1	5
Injury rate	.0025	0.012	0	.091	.0021	0.0089	0	.05	0.00	0.01	0	0.33
Adjusted time to target	53.06	12.39	20.21	75	54.08	22.97	18	120	53.24	18.27	12	120
Moderators												
Zero-sum beliefs	1.99	0.86	1	5	1.94	0.90	1	5	2.03	0.94	1	5
Fixed mindset	2.91	0.99	1	5	3.21	1.06	1	5	3.05	1.01	1	5
Manager buy-in	4.28	0.60	2	5	4.18	0.66	1	5	4.25	0.62	1	5
Cognitive load	1.63	0.70	1	4	1.64	0.69	1	4	1.57	0.66	1	5
Supervisor power	6.39	2.36	1	10	6.03	2.35	1	10	6.49	2.35	1	10
Worker power	4.75	2.76	1	10	4.35	2.79	1	10	4.94	2.73	1	10
Manager power	8.71	2.03	1	10	8.5	2.02	2	10	8.46	2.13	1	10
Supervisor power-worker power	1.64	2.40	-7	9	1.68	2.56	-9	8	1.58	2.26	-9	9
Manager power-supervisor power	2.34	2.21	-5	9	2.46	2.72	-6	9	1.97	2.35	-9	9

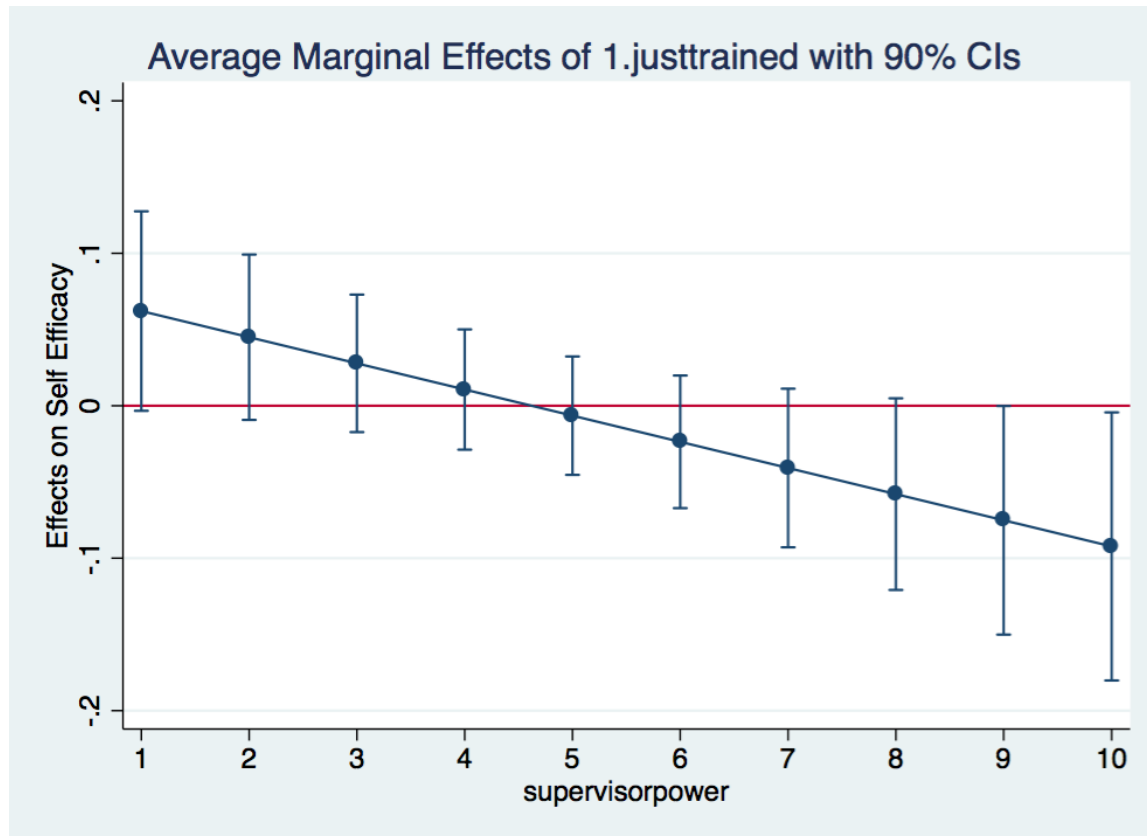**Does training affect self-efficacy?**

There was no direct effect of training on self-efficacy, though when fixed mindset was taken into account, having been trained several months prior did lead to increased self-efficacy—indicating a curing effect. In addition, among supervisors who did not endorse a fixed mindset, training several months prior led to improved self-efficacy, whereas among those who endorsed a fixed mindset, training several months prior led to decreased self-efficacy.

Figure 10. The effect of training several months prior on self-efficacy, moderated by level of fixed mindset.
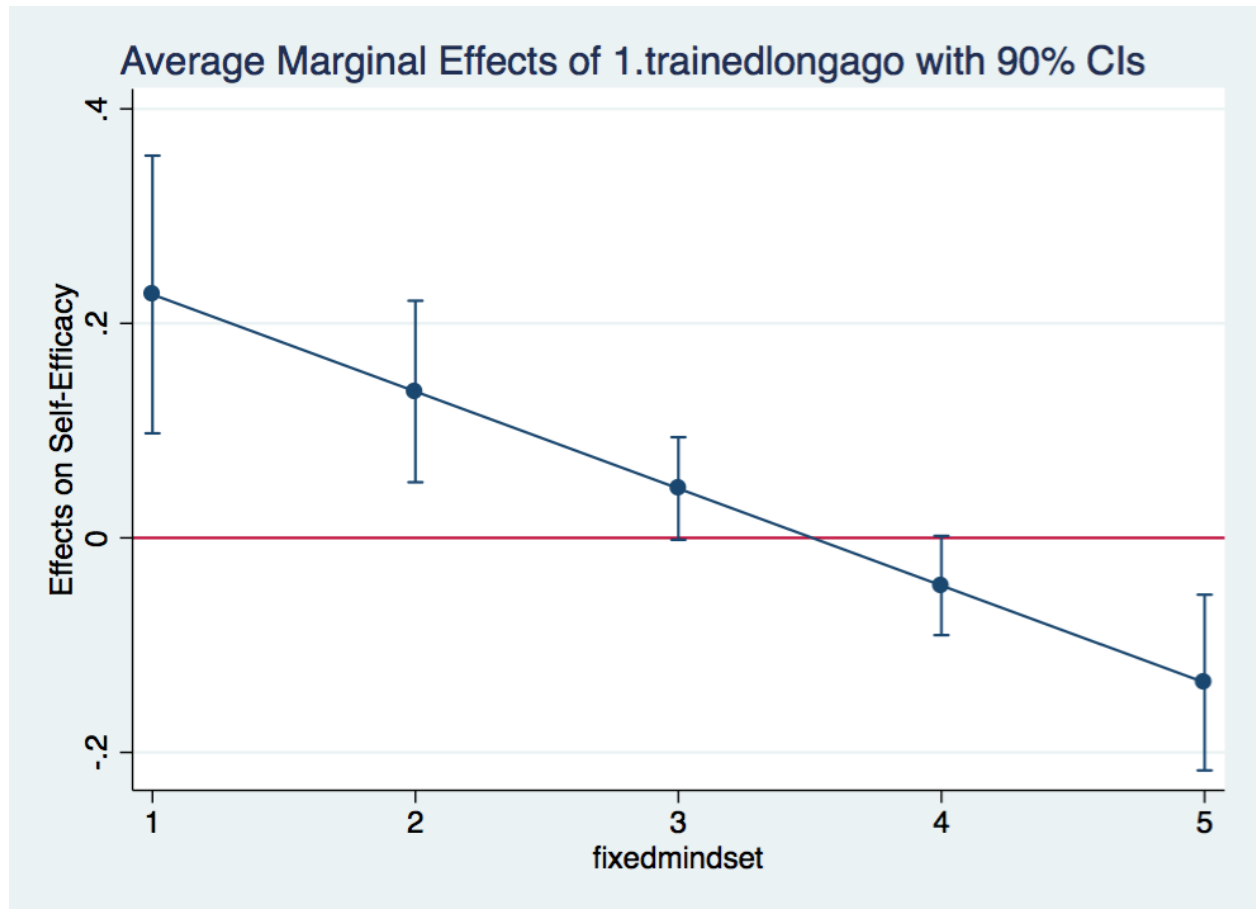
Supervisor power also moderated the effect of training: Supervisors who felt most powerful were actually more likely to show slight decreases in self-efficacy after recent training.

Figure 11. The effect of recent training on self-efficacy, moderated by level of perceived supervisor power.

Apart from training effects, supervisors who felt more powerful were more likely to have higher self-efficacy. Manager buy-in also predicted self-efficacy, such that supervisors who perceived manager support for supervisory skills training felt more confident in their skills. In addition, supervisors who perceived a larger gap between managers' power and their own power reported less self-efficacy.

Does training affect attitudes toward workers?

Outcome dependence. There was no direct effect of training on supervisors' sense of outcome dependence (i.e., the extent to which they felt that their outcomes and workers' outcomes were linked).

The manager/supervisor power gap moderated the effect of training on outcome dependence; supervisors who perceived a larger gap between their own power and mangers' power were more likely to have greater outcome dependence several months after training; for those who saw themselves as more powerful than the managers, there was a slight negative effect of training.

Figure 12. The effect of training several months prior on outcome dependence, moderated by the perceived manager/supervisor power gap.
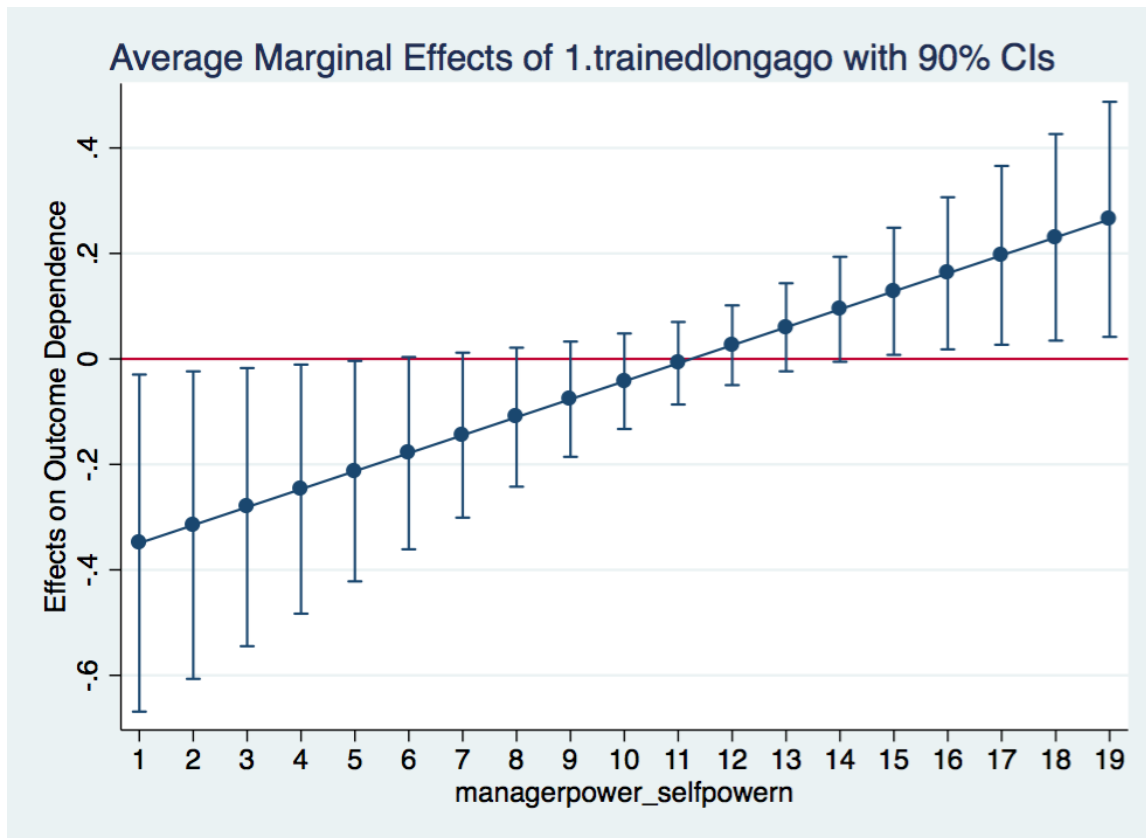
Absolute (as opposed to relative) supervisor power also moderated the effect of training; supervisors who felt less powerful were more likely to have increased outcome dependence several months after training than those who felt more powerful.
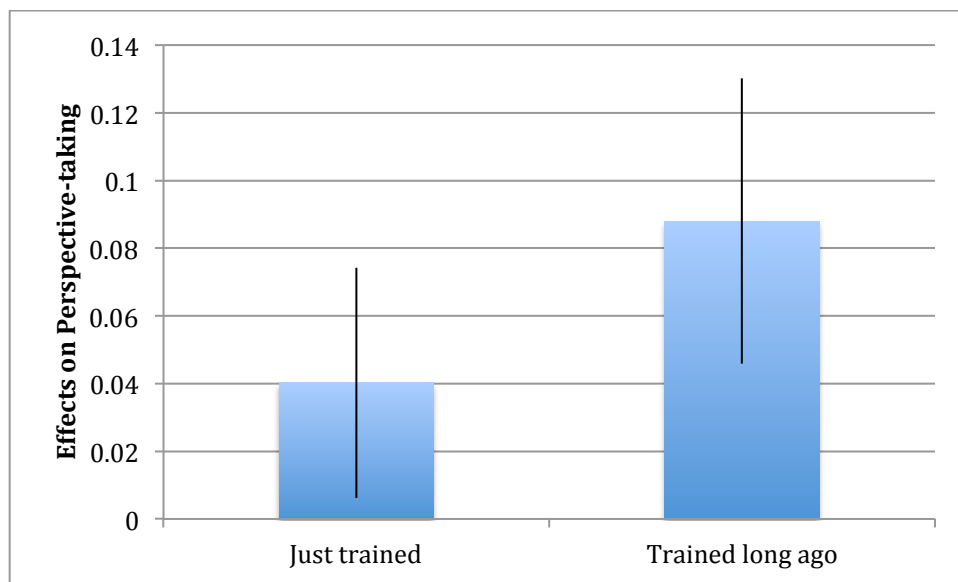
Figure 13. The effect of training several months prior on outcome dependence, moderated by perceived supervisor power.
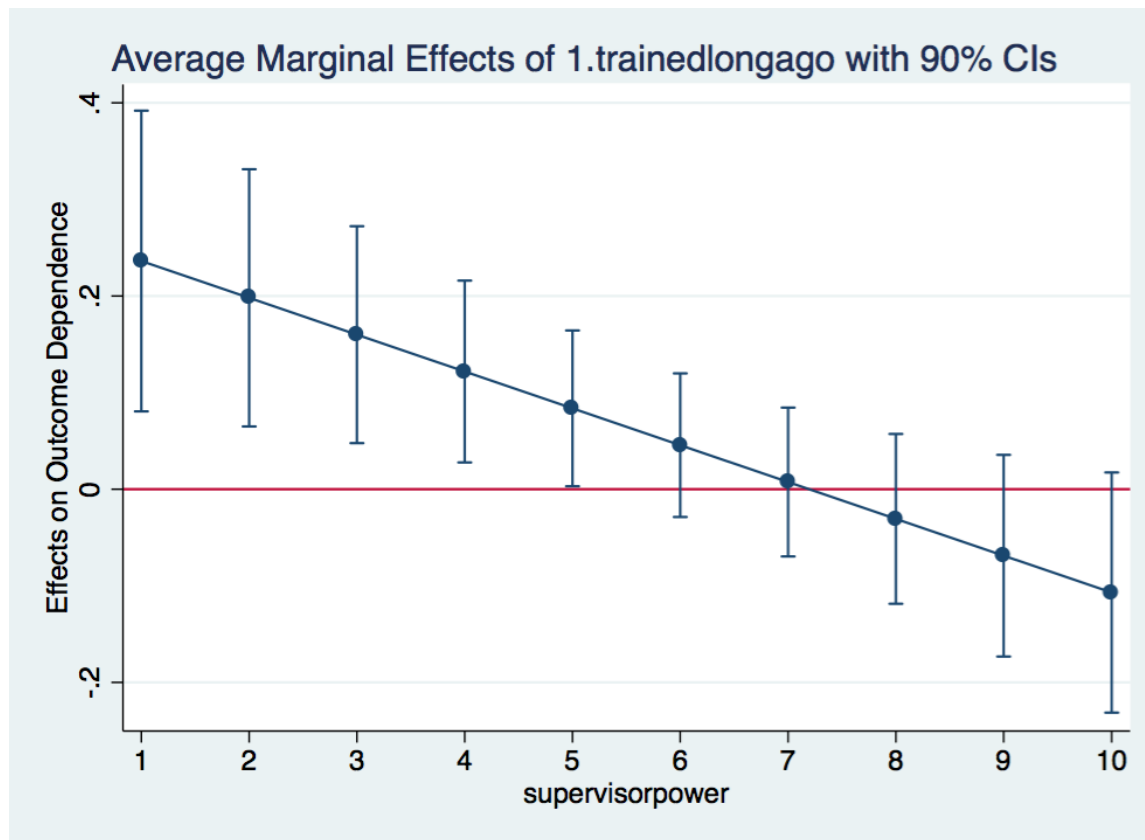
Apart from training effects, manager buy-in predicted outcome dependence; supervisors with more supportive managers also had higher levels of outcome dependence. Interestingly, supervisors who endorsed a fixed mindset more strongly were also slightly more likely to report feeling outcome dependence with their workers. Supervisors with stronger zero-sum beliefs were less likely to feel a sense of outcome dependence with their workers.

Perspective-taking. There was a direct effect of training on perspective-taking; although supervisors who had been trained recently did not show a significant increase in perspective-taking, those who had been trained several months prior were more likely to take their workers' perspectives, showing a curing effect of training (see graph below; error bars reflect standard error). Apart from training effects, supervisors with more supportive managers were also more likely to take their workers' perspectives.

Figure 14. The effect of training on perspective-taking; training several months prior improved perspective-taking, but recent training did not, indicating a curing effect.

Individuation. There was also a direct effect of training on individuation, meaning that supervisors who had been trained several months prior were more likely to see their workers as individuals (in this case, more likely to ask them about their life outside of work); the effect of recent training was particularly strong among supervisors who did not endorse a fixed mindset.

Figure 15. The effect of recent training on individuation, moderated by level of fixed mindset.

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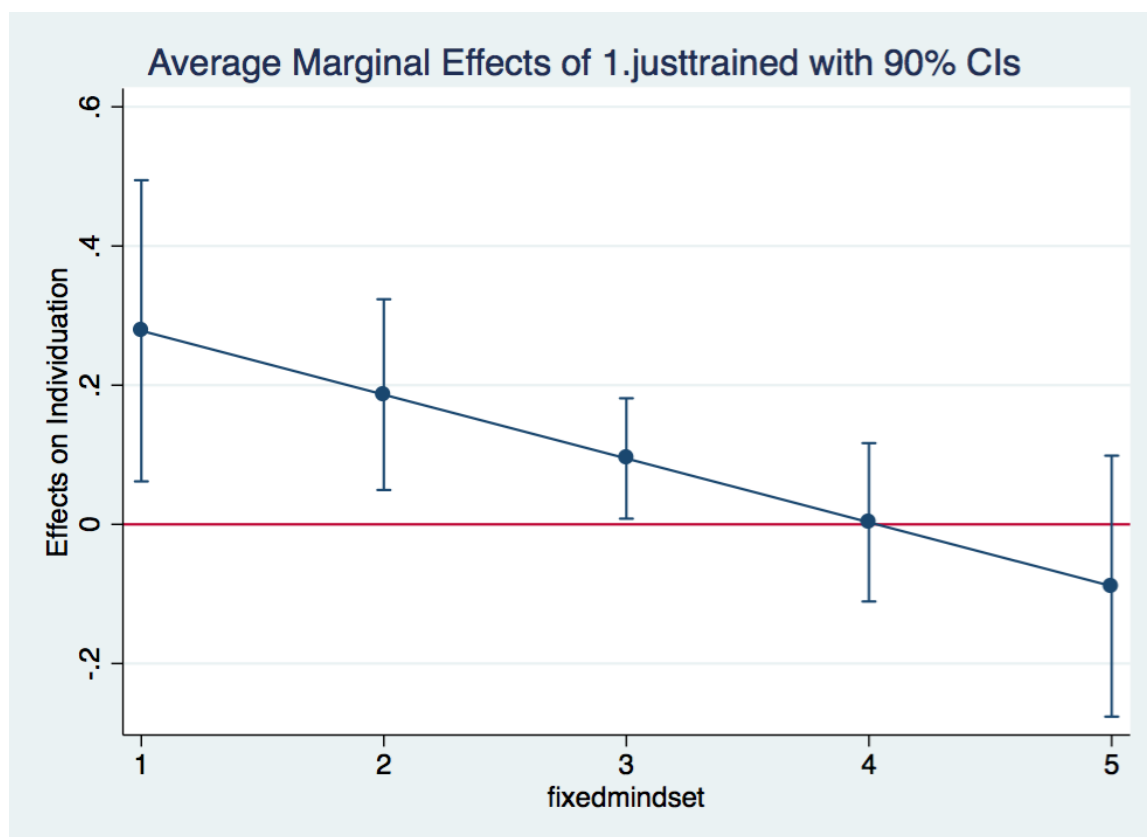
Apart from training effects, supervisors who felt more powerful and supervisors who endorsed zero-sum beliefs were also more likely to individuate their workers.

Personal beliefs about working conditions. Supervisors' beliefs about the importance of safe and comfortable working conditions were not directly affected by training. The effect of training was moderated by the supervisor/manager power gap, however. Supervisors who felt that they had greater power than their managers showed a negative shift in beliefs about working conditions after recent training, while those who felt that their managers had much more power than they did were positively affected by recent training, showing improvements in beliefs about working conditions.

Figure 16. The effect of recent training on beliefs about working conditions, moderated by the perceived manager/supervisor power gap.
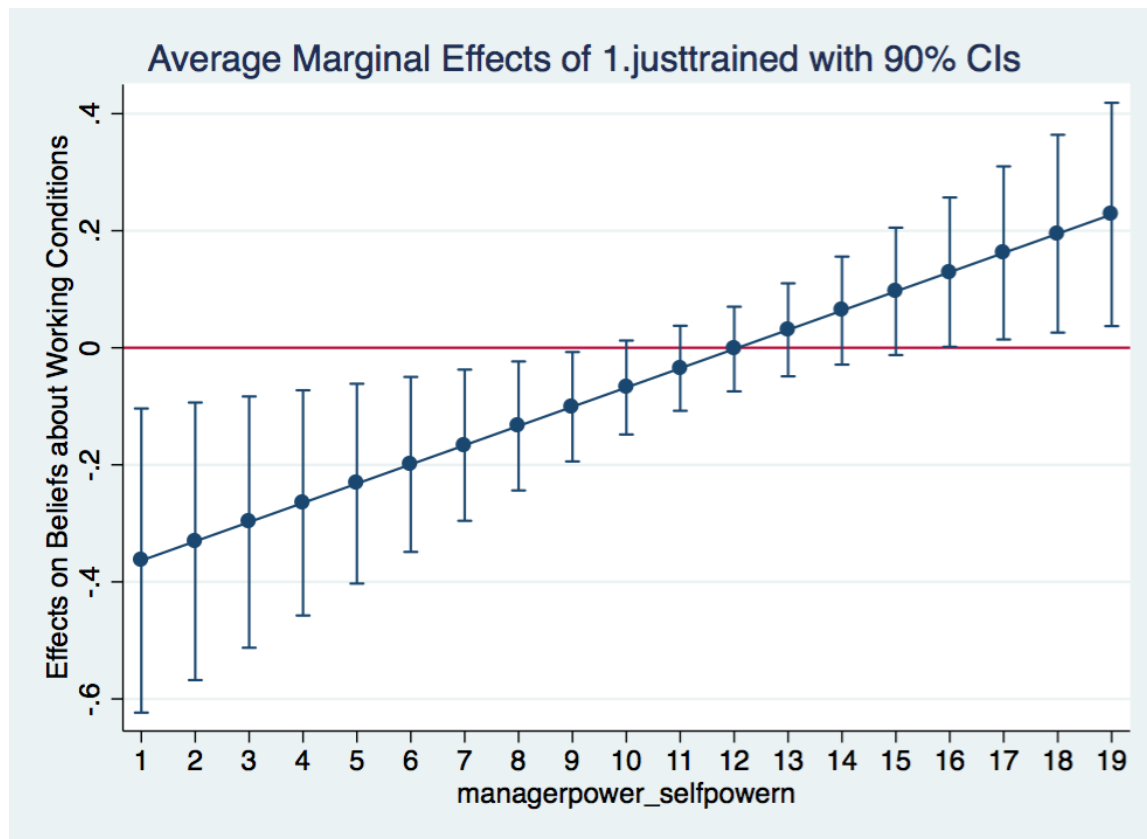
Apart from training effects, female supervisors were less likely to agree that working conditions should be safe and comfortable. Those with supportive managers and those who rejected a zero-sum view of working conditions were more likely to believe that working conditions should be comfortable and safe.

Humanization. An interaction between supervisor power and recent training indicated that recent training increased humanization only for those supervisors who saw themselves as less powerful; accounting for this interaction, however, there was an overall positive effect of training (either recent or several months prior) on humanization.

Figure 17. The effect of recent training on humanization, moderated by perceived supervisor power.
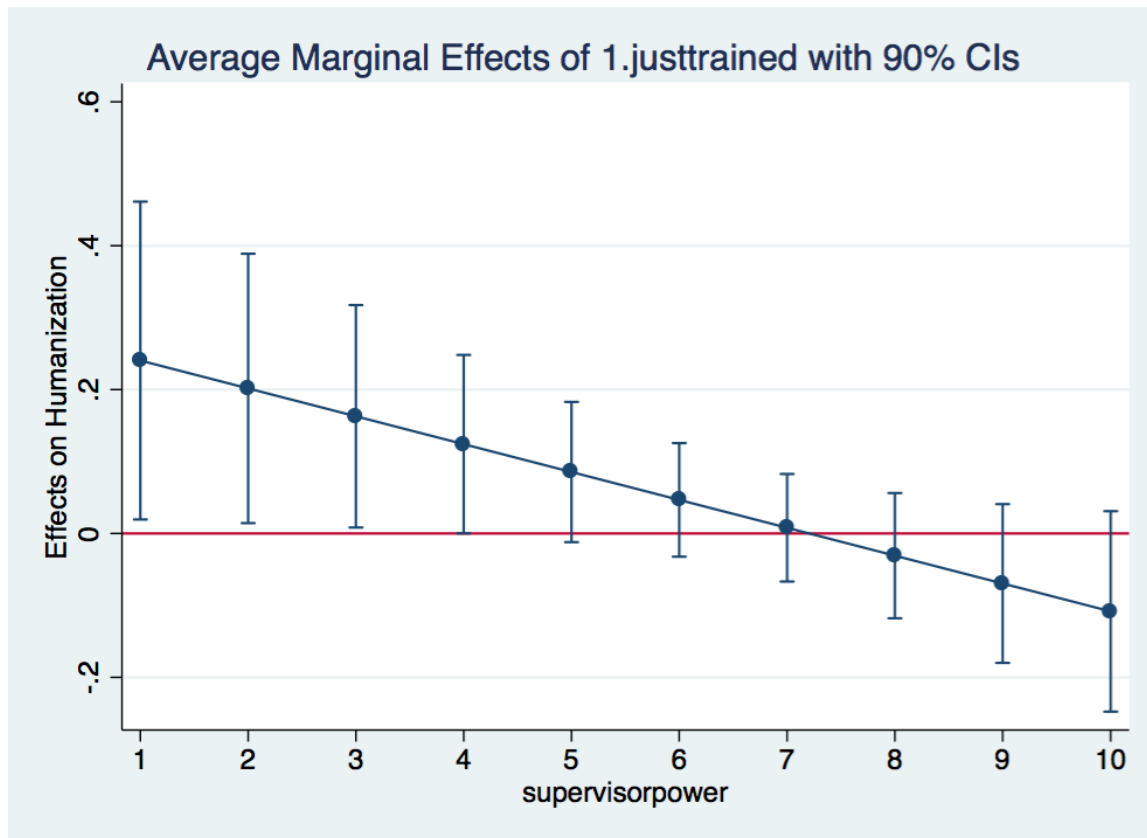
The effect of training on humanization was also moderated by the gap between manager and supervisor power; training (recent or several months prior) increased humanization when supervisors perceived a larger gap between their power and managers' power. Supervisors who saw themselves as more powerful than managers actually showed a slight decrease in humanization after recent training.

Figure 18. The effect of training several months prior on humanization, moderated by the perceived manager/supervisor power gap.
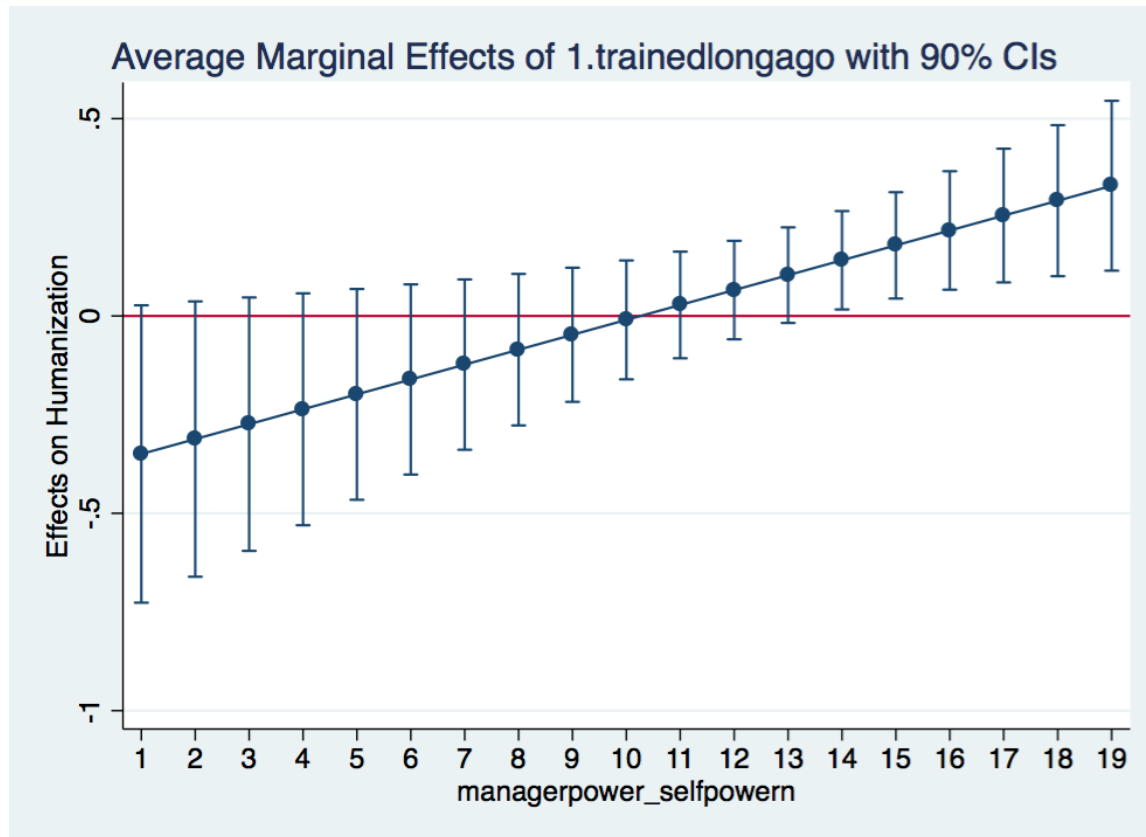
In general, perceiving a larger gap between manager and supervisor power predicted greater humanization of workers. Those who more strongly endorsed zero-sum beliefs, or who had managers less supportive of supervisory skills training, were less likely to humanize their workers; these results were all separate from training effects.

Dehumanization. There was no direct effect of training on dehumanization (i.e., the belief that workers will work hard only when threatened or forced to), but an effect did appear for those trained recently when zero-sum beliefs, supervisor power, or the gaps between manager and supervisor power or worker and supervisor power were accounted for; in those cases, recent training decreased dehumanization, but the training effect decayed.

Apart from training effects, dehumanization was predicted by a number of factors: Supervisors who more strongly endorsed a fixed mindset or zero-sum beliefs, those under greater cognitive load, and those with managers who were less supportive of supervisory skills training were also more likely to dehumanize their workers.

Does training affect productivity?

Turnover. Having received supervisory skills training made supervisors more likely to remain in the data set (and thus, presumably, less likely to have left the factory). The effect of training on turnover among supervisors' workers depended on a few moderating factors. Manager buy-in played a role: Supervisors who perceived the least support from their managers for training were the most likely to have increased turnover several months after training.

Figure 19. The effect of training several months prior on turnover, moderated by perceived manager support.

Average Marginal Effects of 1.trainedlongago with 90% CIs
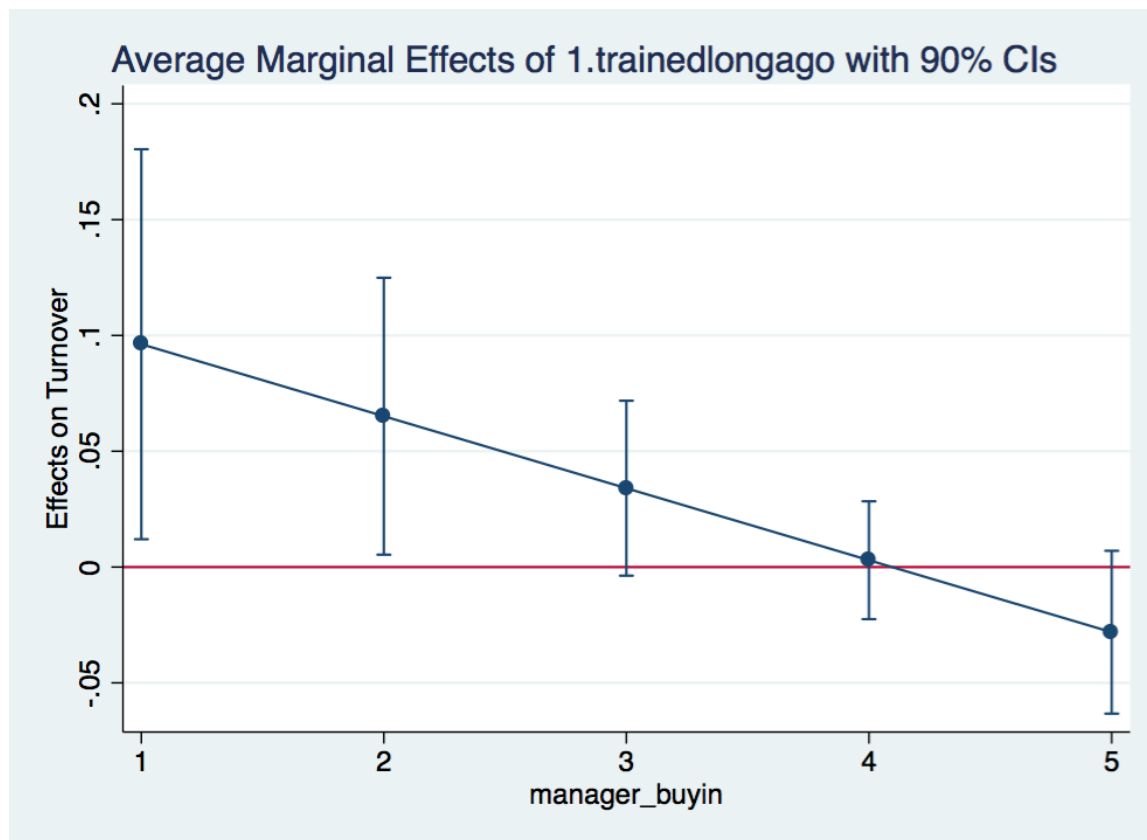
There was also an interaction with the manager/supervisor power gap, such that those who felt their own power was greater than that of managers were more likely to see reductions in turnover due to training (again, either recently or several months ago; for those trained several months ago, the effect persisted for supervisors who rated their power as equal to managers'). When accounting for this interaction, there was an overall effect of training such that in general, supervisors who received training several months ago had significantly reduced turnover.

Figure 20. The effect of training several months prior on turnover, moderated by the perceived manager/supervisor power gap.

Average Marginal Effects of 1.trainedlongago with 90% CIs
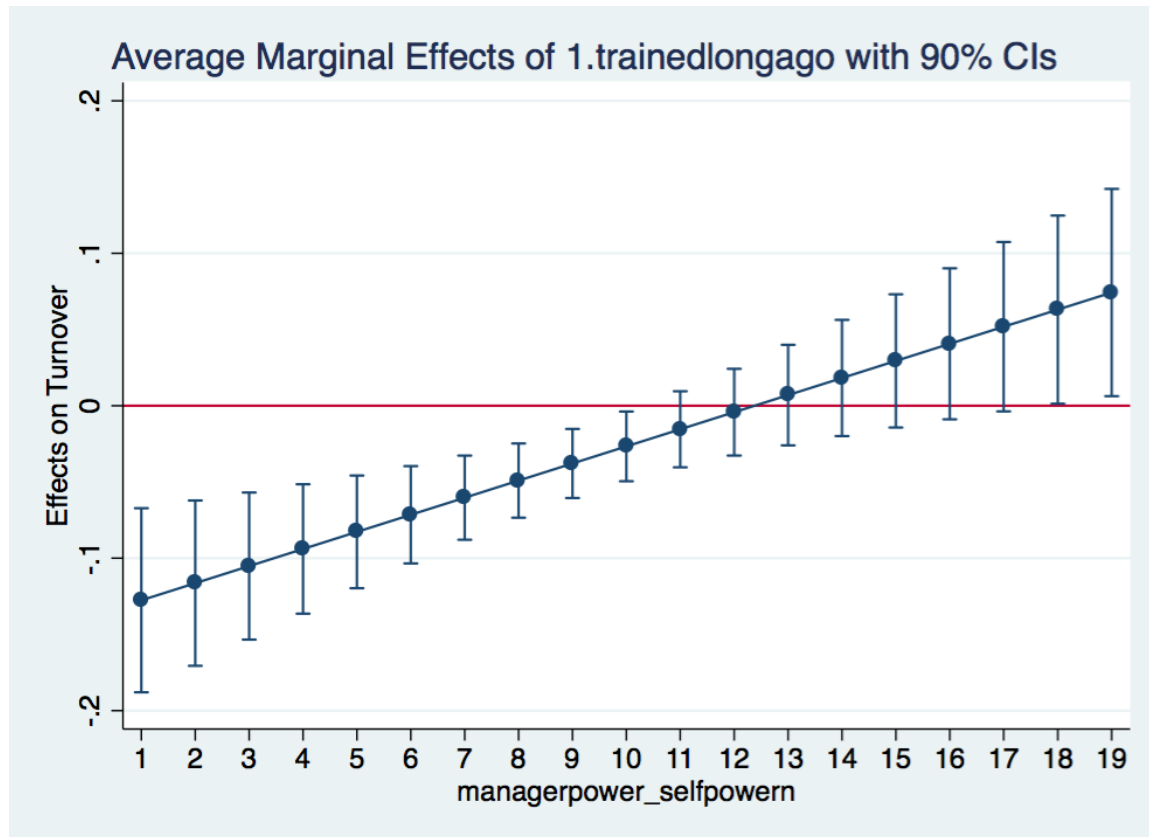
The same pattern appeared for the supervisor/worker power gap, such that those who felt that workers had more power than they did were more likely to have reduced turnover after having recently been trained.
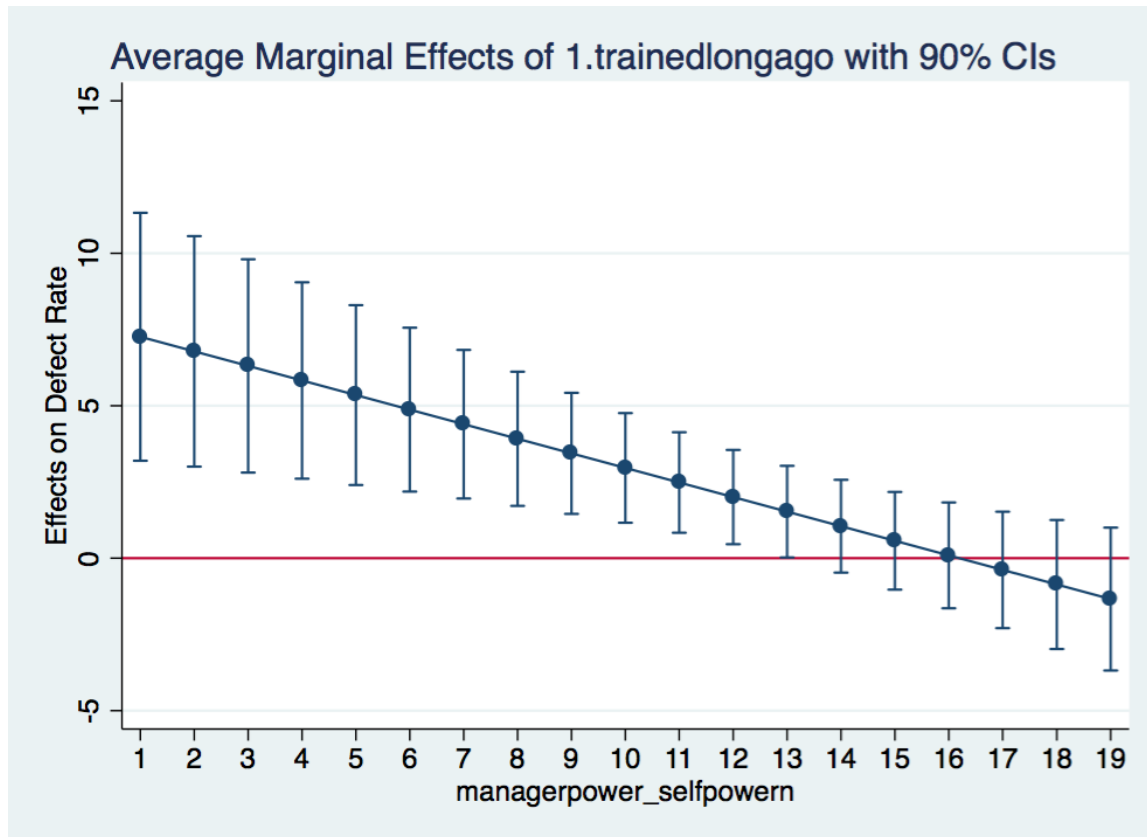
Figure 21. The effect of training several months prior on turnover, moderated by the perceived worker/supervisor power gap.
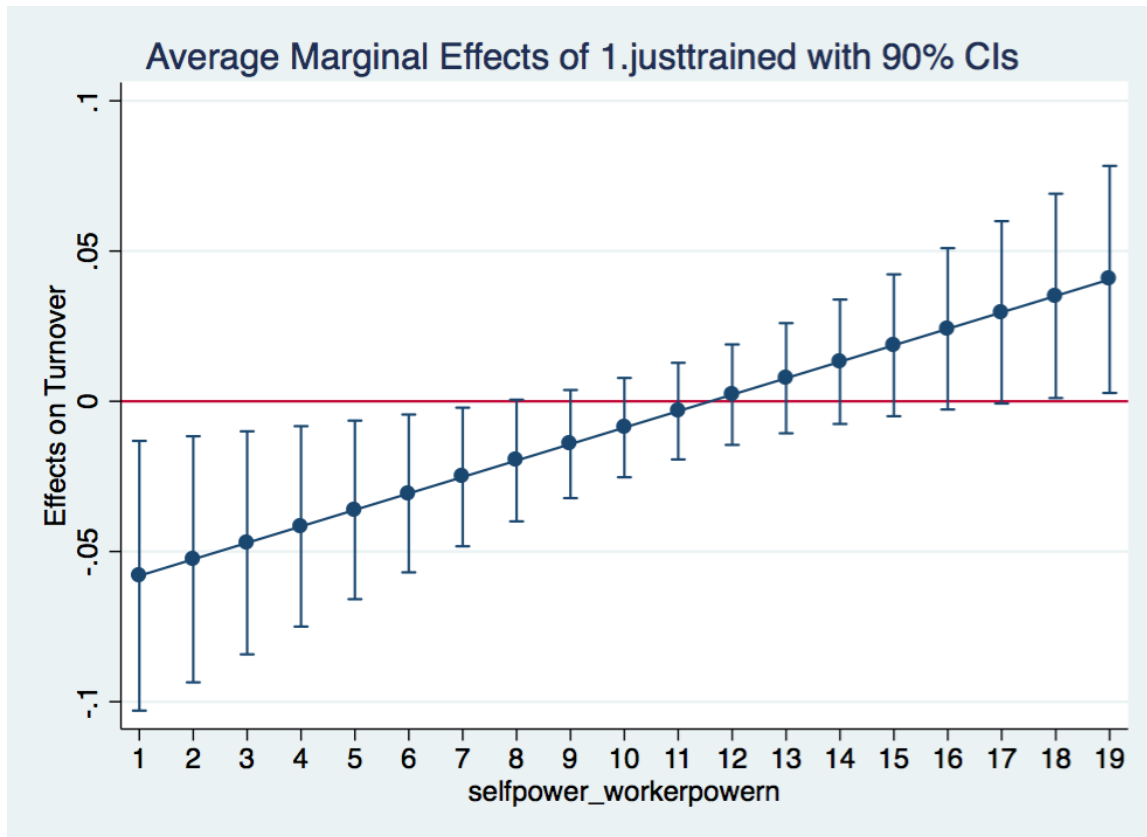
In addition, apart from training effects, supervisors who felt more powerful had lower turnover rates.

Defect rates. The manager/supervisor power gap moderated the effect of training, such that among supervisors who felt that managers had only slightly more power than they did, or that they had more power than their managers, training several months prior led to higher defect rates. When taking this interaction into account, having been trained several months prior generally predicted higher defect rates. Interestingly, apart from training effects, manager buy-in for training predicted higher defect rates.

Figure 22. The effect of training several months prior on the defect rate, moderated by the perceived manager/supervisor power gap.


Zero-sum beliefs also moderated the effect of training; supervisors who endorsed zero-sum beliefs were more likely to have higher defect rates several months after training, but those who rejected zero-sum beliefs had no change in their defect rates after training.

Figure 23. The effect of training several months prior on the defect rate, moderated by zero-sum beliefs.
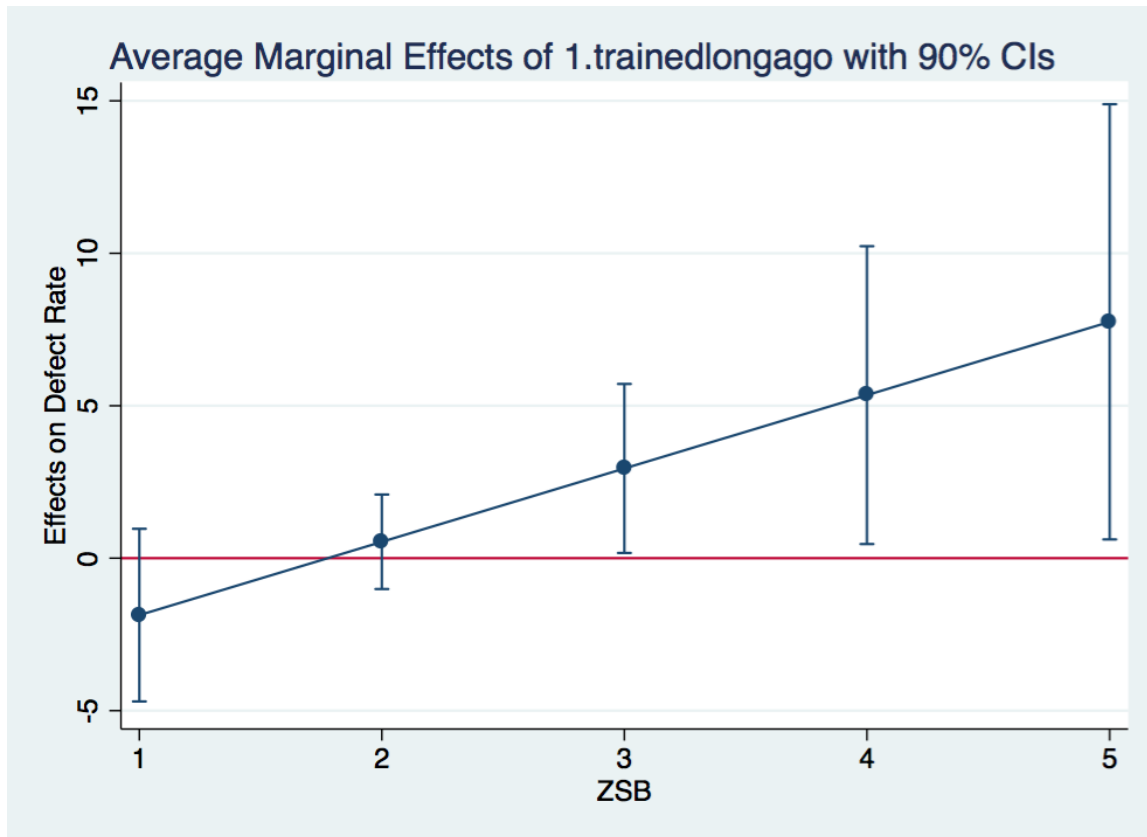
Injury rates. Supervisors who had been trained several months prior had lower injury rates among their workers. In addition, there was some moderating effect of manager buy-in; surprisingly, supervisors with less supportive managers were more likely to have lower injury rates after recent training. However, accounting for this interaction, the overall effect of having recently been trained was to lower injury rates.
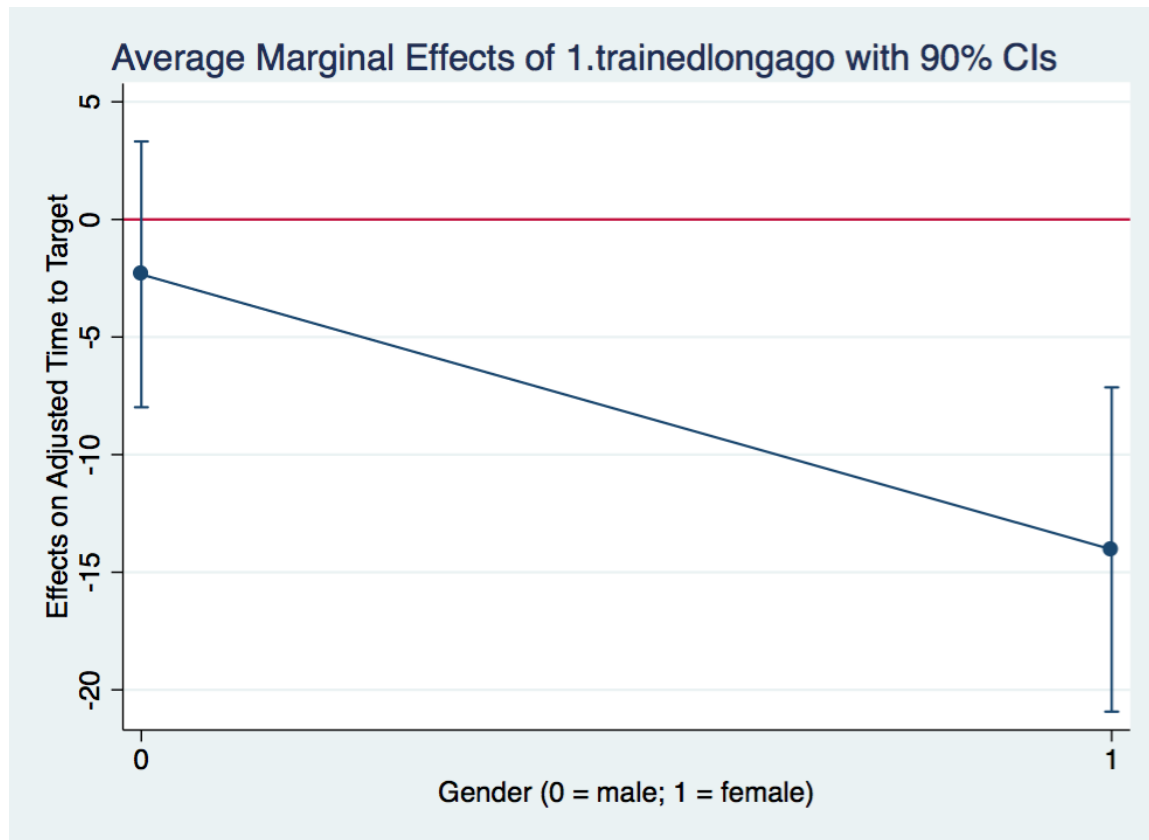
Figure 24. The effect of recent training on the injury rate, moderated by perceived manager support.
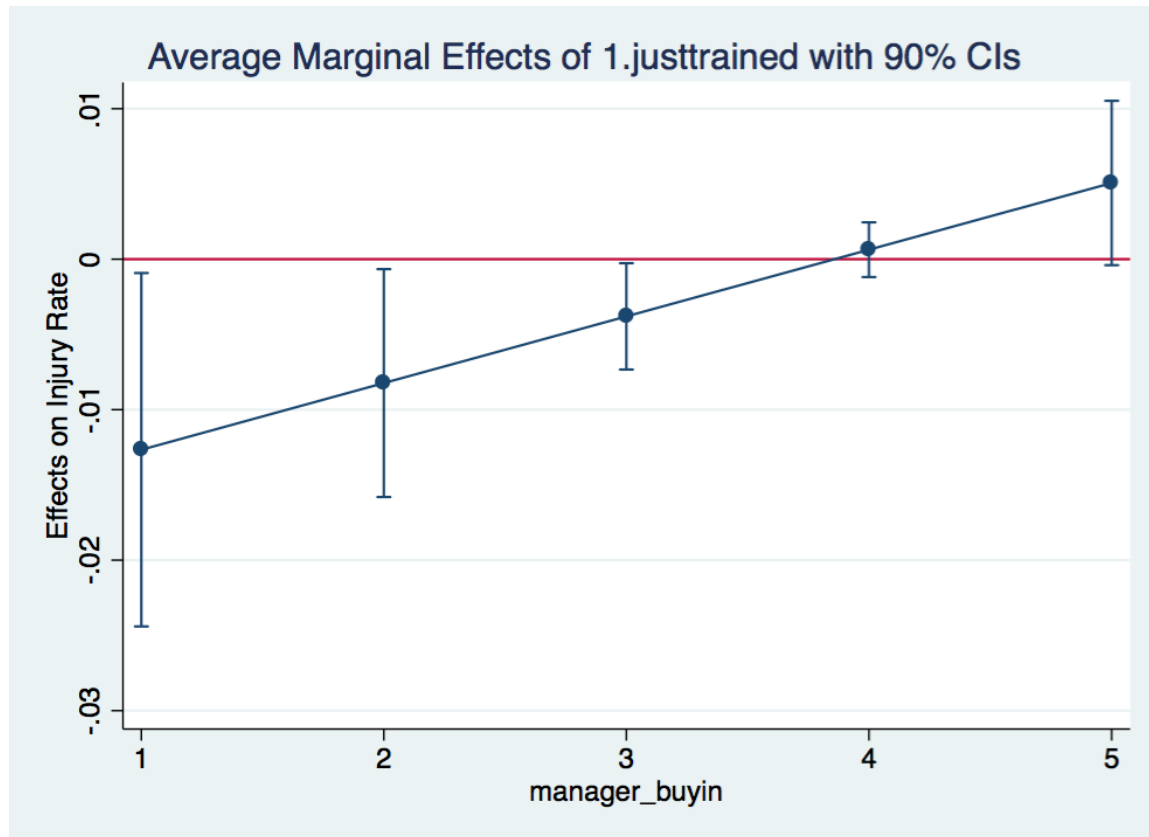
Apart from training effects, zero-sum beliefs predicted higher injury rates.

Time to reach hourly target. As discussed above, we adjusted the time to target to account for changes in target size over time. There was a curing effect of training on adjusted time to target; training received several months prior led to supervisors' lines reaching their hourly targets eleven minutes faster. This effect was driven by female supervisors, who showed a larger effect of training on time to target.

Figure 25. The effect of training several months prior on adjusted time to target, moderated by gender.

Fixed mindset also moderated the effect of training, such that supervisors who rejected a fixed mindset showed productivity boosts from recent training, but those who endorsed a fixed mindset did not.

Figure 26. The effect of recent training on adjusted time to target, moderated by level of fixed mindset.
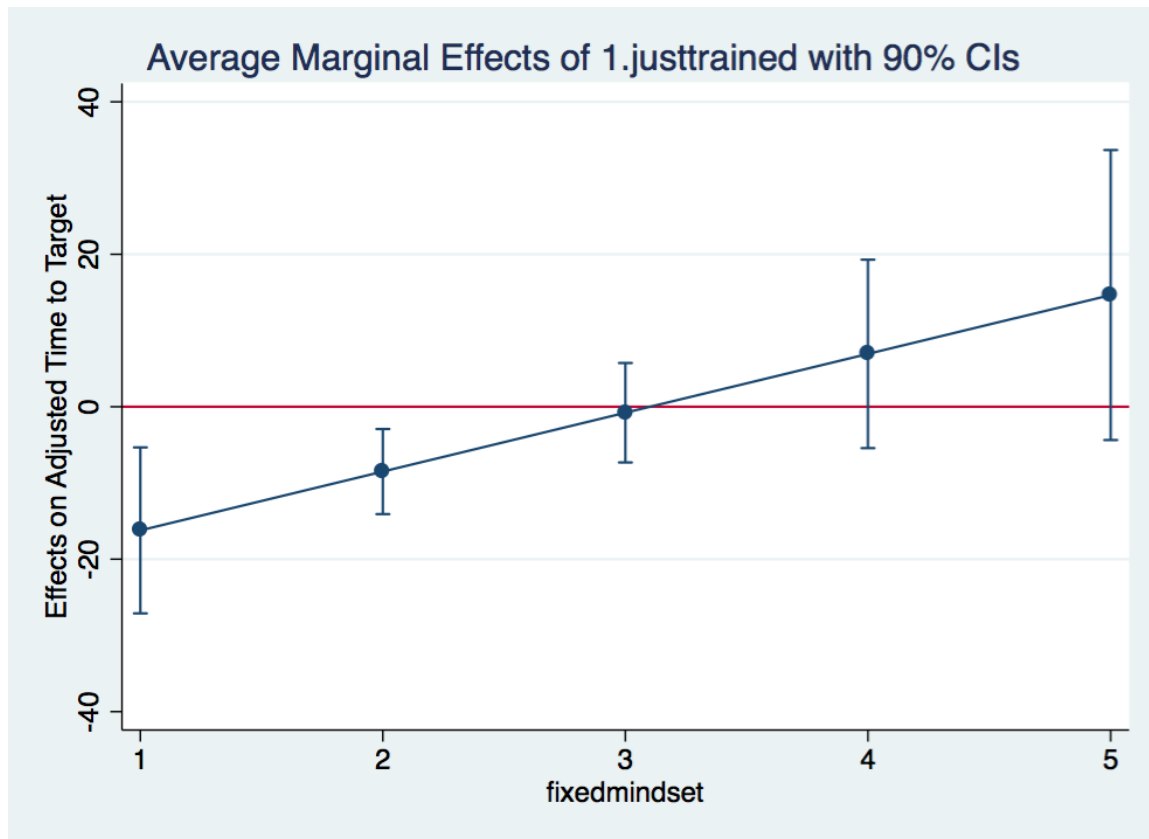
Although supervisors who endorsed zero-sum beliefs had lower adjusted times to target, this effect was qualified by an interaction: Zero-sum beliefs moderated the effect of training, such that supervisors who had received training several months prior had lower adjusted times to target if they rejected zero-sum beliefs, but not if they endorsed zero-sum beliefs.

Figure 27. The effect of training several months prior on adjusted time to target, moderated by zero-sum beliefs.
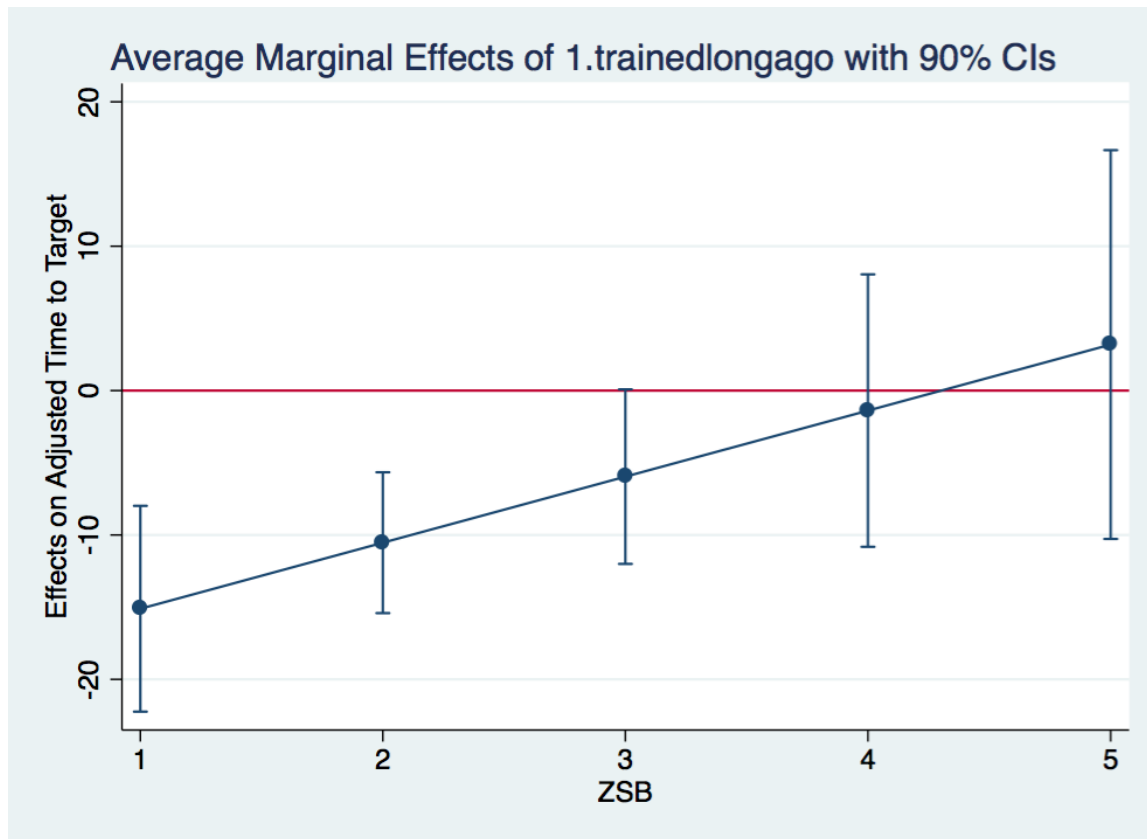
We also calculated the percent change in hourly output attributable to training. If the time to reach an hourly production target is reduced by x minutes, the percent change in productivity is x as a percent of the adjusted time to target. The percent change in hourly output attributable to training is found by multiplying the coefficient on training in the adjusted time to target equation (-11.44) by -100 as a percent of the average adjusted time to target (53.24), which yields a productivity increase of 21.5% (see equation below).

$$\frac{\%\Delta HourlyOutput}{Training} = \frac{-11.44 * (-100)}{53.24} = 21.5\%$$

The fraction of the productivity gain that accrues to the worker depends on whether, as a consequence of the productivity effect, the firm increases the target. We can calculate the average expected productivity bonus increase for workers, by subtracting 60 from the unadjusted time to target for each supervisor, dividing that number by 60, multiplying the result by the coefficient above (-11.44), dividing by the adjusted time to target for each supervisor, and finally subtracting the coefficient for the effect of training on the unadjusted time to target (3.137) divided by 60. The mean of the resulting variable is .044, meaning that we would expect a 4.4% increase in workers' productivity bonuses due to training.

Line balancing: Worker idleness. There were no direct training effects on worker idleness. The power gap between managers and supervisors moderated the effect of training, such that

among supervisors who had been trained recently, training reduced worker idleness only when there was a larger gap between manager and supervisor power.

Figure 28. The effect of recent training on worker idleness, moderated by the perceived manager/supervisor power gap.
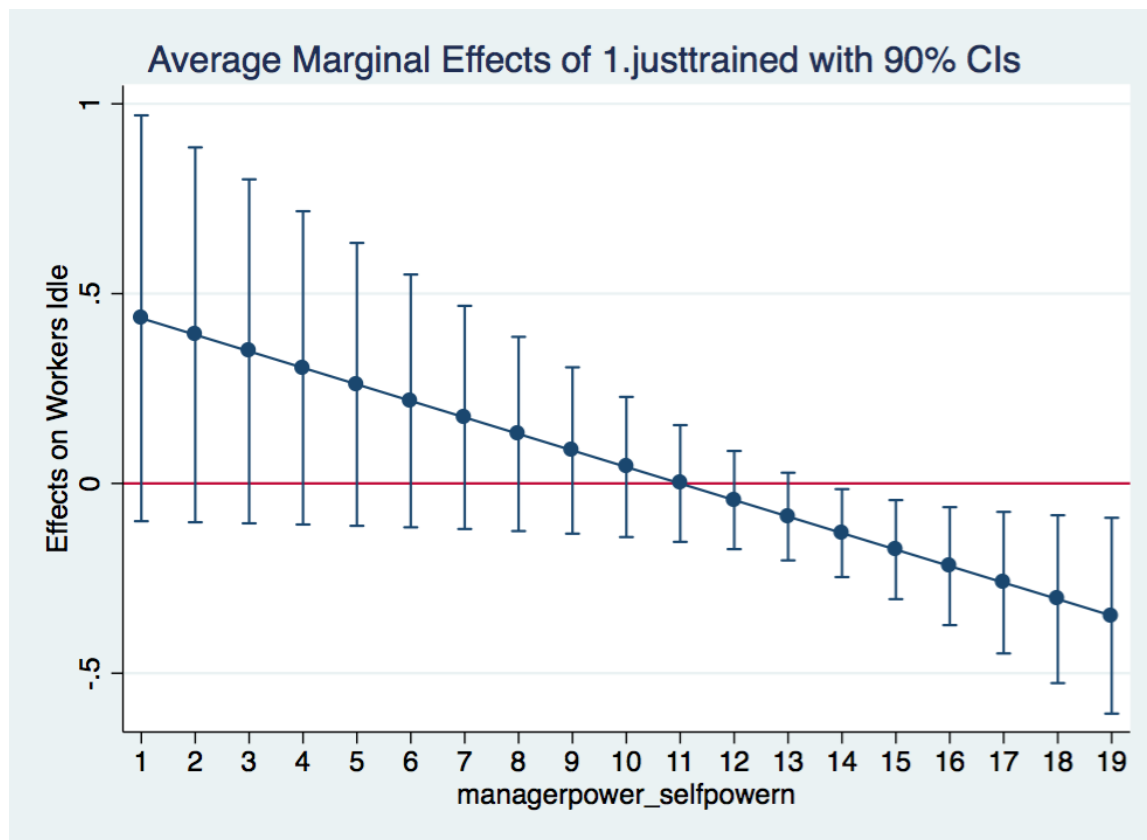

Although recent training led to increased reports of worker idleness when manager buy-in was taken into account, this was qualified by an interaction, such that among supervisors with the most supportive managers, recent training led to decreased worker idleness while among supervisors with the least supportive managers, recent training led to increased worker idleness.

Figure 29. The effect of recent training on worker idleness, moderated by perceived manager support.
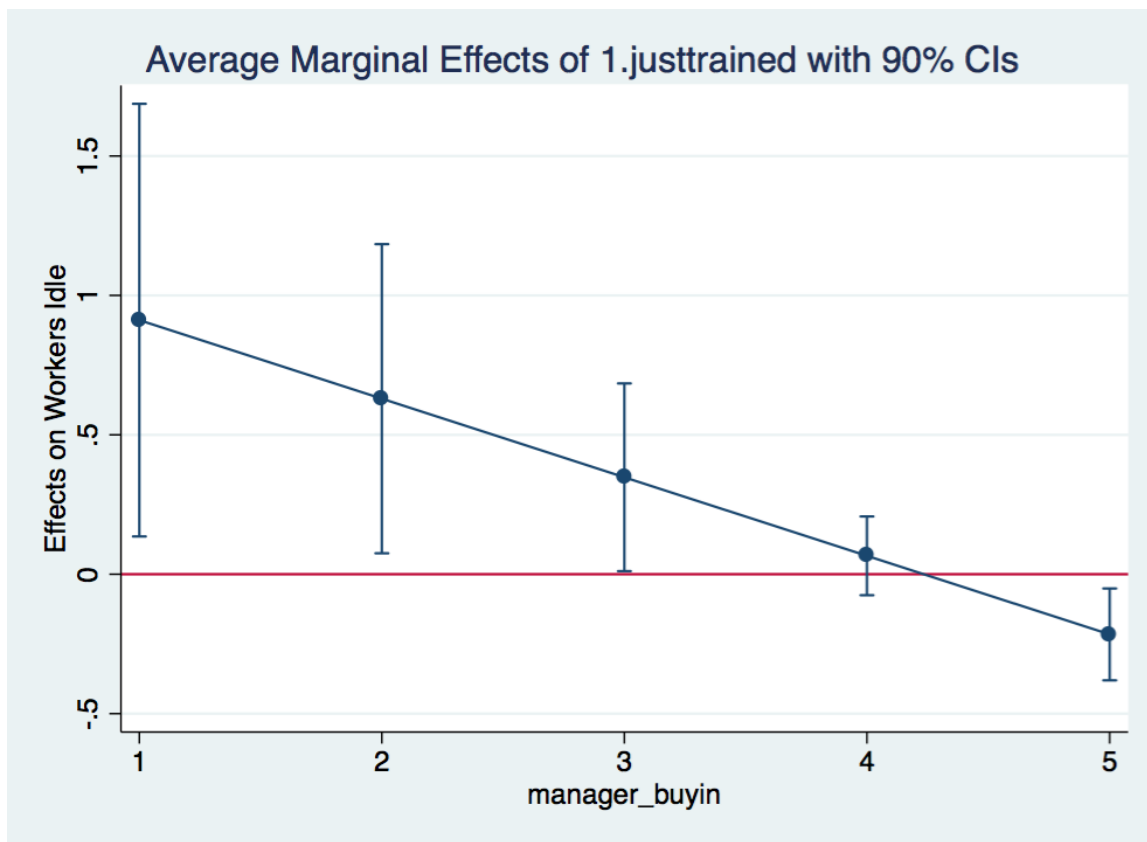
Fixed mindset also played an important role in predicting worker idleness: Among supervisors who did not endorse a fixed mindset, training several months prior led to decreases in worker idleness. Among supervisors who endorsed a fixed mindset, training several months prior had no effect or actually increased worker idleness.

Figure 30. The effect of training several months ago on worker idleness, moderated by level of fixed mindset.
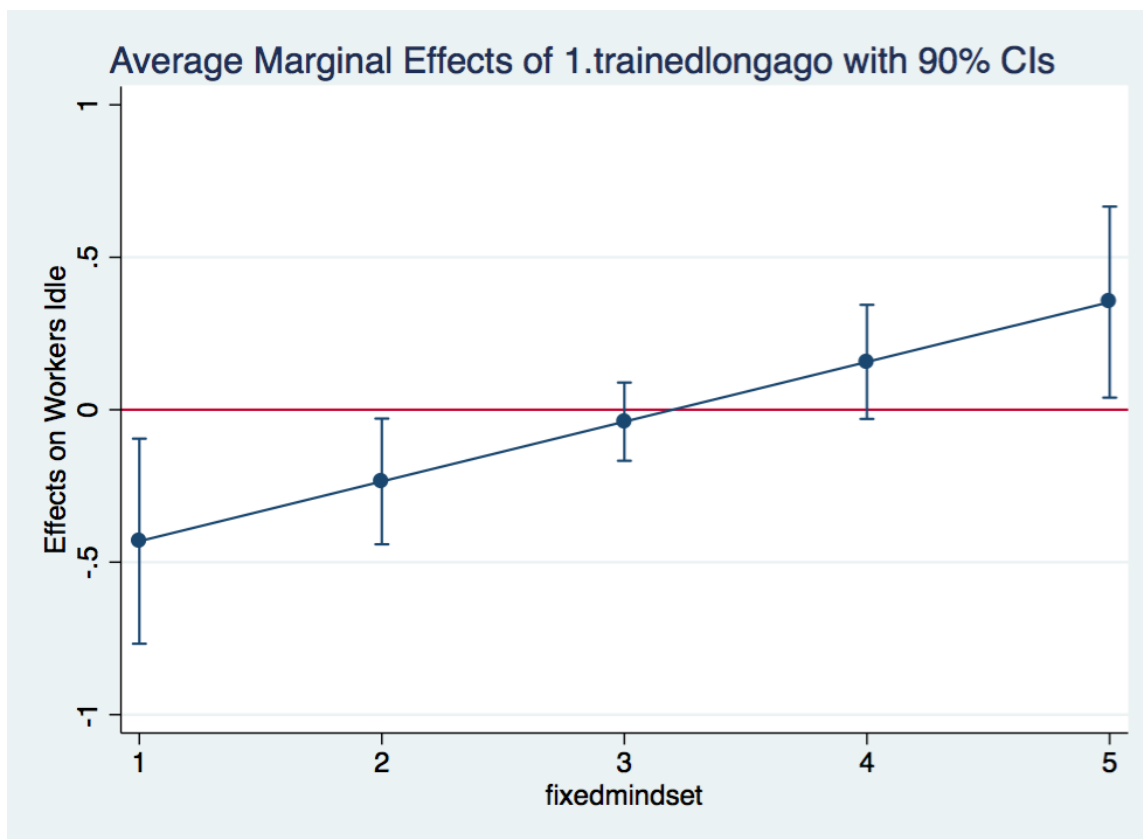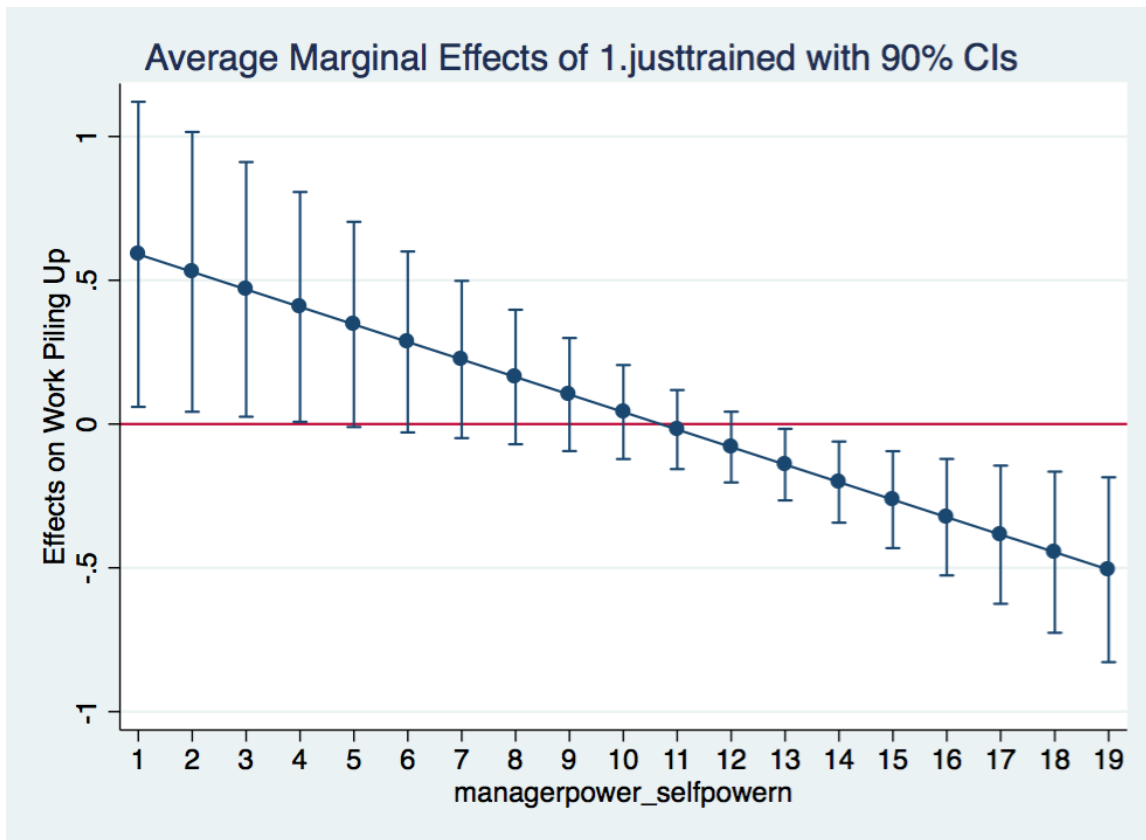

Apart from training effects, cognitive load also predicted worker idleness: The more supervisors experienced cognitive load, the more often they reported seeing workers sitting idle.

Line balancing: Work piling up. There were direct effects of training, with supervisors trained either recently or longer ago reporting less work piling up. However, this effect was driven by male supervisors: Male but not female supervisors reporting less work piling up after training (either several months prior or recently).

There was more work pile-up when there was a larger gap between manager and supervisor power, and an interaction with training such that among supervisors who had recently been trained, training reduced work piling up only when there was a larger gap between manager and supervisor power; when supervisors felt that they had more power than managers, training increased work piling up. A similar pattern emerged for supervisors who had been trained several months prior.

Figure 31. The effect of recent training on work piling up, moderated by the perceived manager/supervisor power gap.

Average Marginal Effects of 1.justtrained with 90% CIs

Apart from training effects, supervisors with more cognitive load reported more work piling up. More powerful supervisors reported less work piling up.

Summary of Results

Does training affect self-efficacy?

Training improved self-efficacy for:

- Supervisors who did not endorse a fixed mindset (with curing)

Training decreased self-efficacy for:

- Supervisors who felt most powerful (though this effect decayed)

Other factors that increased self-efficacy:

- Supervisor power (supervisors who felt more powerful were more likely to have higher self-efficacy)
- Having supportive managers
- Perceiving less manager power relative to supervisors' own power

In sum: Training effects on self-efficacy

- Mindset and power moderated training's effect on self-efficacy; training improved self-efficacy only for those supervisors who did not endorse a fixed mindset (with curing), and decreased self-efficacy for supervisors who felt most powerful (though this effect decayed).

Does training affect attitudes toward workers?

Training reduced dehumanization when:

- Zero-sum beliefs, supervisor power, or the gaps between manager and supervisor power or worker and supervisor power were accounted for (though the effect decayed)

Other factors that increased dehumanization:

- Endorsing a fixed mindset
- Endorsing zero-sum beliefs
- Greater cognitive load
- Having managers who were less supportive of supervisory skills training

Training increased humanization for:

- Supervisors who felt less powerful (though the effect decayed)
- Supervisors who perceived more of a power gap between themselves and their managers (those who felt they had more power than managers were slightly more likely to be negatively affected; this effect decayed but the first did not)

Other factors that increased humanization:

- Less endorsement of zero-sum beliefs
- Manager support for supervisory skills training
- Larger perceived gap between own power and managers' power

Training improved beliefs about working conditions for:

- Supervisors who perceived more of a power gap between themselves and their managers (those who felt they had more power than managers were slightly more likely to be negatively affected; these effects decayed)

Other factors that improved working conditions beliefs:

- Gender (male supervisors were more likely to agree that working conditions should be safe and comfortable)
- Having supportive managers
- Rejecting zero-sum beliefs

Training improved individuation, especially for:

- Supervisors who did not endorse a fixed mindset (though this effect decayed)

Other factors that improved individuation:

- Endorsing zero-sum beliefs
- Feeling powerful

Training improved perspective-taking (with curing).

Other factors that improved perspective-taking:

- Having supportive managers

Training improved outcome dependence for:

- Supervisors who perceived a larger gap between manager power and their own power (with curing)
- Supervisors who felt less powerful

Other factors that affected outcome dependence:

- Having supportive managers
- Endorsing a fixed mindset
- Rejecting zero-sum beliefs

In sum: Training effects on attitudes toward workers

- The manager/supervisor power gap proved important. Training reduced dehumanization when this gap was accounted for, and improved humanization, outcome dependence, and beliefs about working conditions for those supervisors who perceived a larger power gap.
- Training directly improved individuation.
- Training directly improved perspective-taking (with curing).

Does training affect productivity?

Training reduced turnover for supervisors themselves, and for the workers of:

- Supervisors who felt more powerful than their managers
- Supervisors who felt less powerful than their workers (though this effect decayed)

Training increased turnover for:

- Supervisors with the least supportive managers (after curing)

Other factors that affected turnover:

- Supervisors' sense of their own power (supervisors who felt more powerful had lower turnover rates)

Training increased defect rates, especially for:

- Supervisors who felt that managers had only slightly more power than they did, or that they had more power than their managers (after curing)
- Supervisors who endorsed zero-sum beliefs

Other factors that affected defect rates:

- Manager buy-in (supervisors who reported having supportive managers reported higher defect rates)

Training reduced injury rates, especially for:

- Supervisors with less supportive managers (though the effect decayed)

Other factors that affected injury rates:

- Zero-sum beliefs (supervisors who endorsed zero-sum beliefs had higher injury rates)

Training decreased the time to hourly target, especially for:

- Female supervisors
- Supervisors who did not endorse a fixed mindset
- Supervisors who did not endorse zero-sum beliefs

Training reduced worker idleness for:

- Supervisors who perceived a larger gap between manager power and their own power (though this effect decayed)
- Supervisors with the most supportive managers (though for supervisors with the least supportive managers, training increased idleness, and these effects decayed over time)
- Supervisors who did not endorse a fixed mindset (among those who did endorse a fixed mindset, training had no effect or increased worker idleness; both effects required curing)

Other factors that affected worker idleness:

- Cognitive load (the more supervisors experienced cognitive load, the more often they reported seeing workers sitting idle)

Training reduced work piling up, especially for:

- Male supervisors
- Supervisors who perceived a larger gap between manager power and their own power (training increased work piling up when supervisors felt that they were more powerful than their managers)

Other factors that affected work piling up:

- Cognitive load (supervisors with more cognitive load reported more work piling up)
- Supervisor power (the more power supervisors felt they had in absolute terms, the less they reported work piling up)

In sum: Training effects on productivity

- Training effects on productivity were often influenced by the supervisors' perceived power gap with managers. When accounting for this moderating effect of the power gap, training increased defect rates but decreased worker turnover rates; both effects required curing, not appearing until several months after training took place.
- Training increased the likelihood that supervisors remained in the data set (presumably because it reduced supervisor turnover).
- There was no direct effect of training on the frequency of worker idleness, but effects appeared for supervisors who perceived a larger power gap with managers (after recent training only), those with the most supportive managers (also after recent training), and those who did not endorse a fixed mindset (several months after training).
- Training did have a direct effect on the frequency of work piling up (an effect driven by male supervisors).
- Training decreased injury rates (with curing).
- There was a large effect of training on adjusted time to hourly target; with curing, training reduced time to target by 11 minutes (an effect driven by female supervisors). This translates to a 22% increase in productivity due to training.

Conclusions

Training had positive effects on all three categories of outcomes measured: self-efficacy, attitudes toward workers, and productivity. Although there were some direct effects of training, the effect was often moderated by other variables, like mindset or perceived power. With only a few exceptions, the effects of training disappeared or even reversed when supervisors endorsed a fixed mindset or zero-sum beliefs, felt more powerful generally or more powerful than their mangers, or when they reported less support from managers for supervisory skills training. Similarly, training was more effective when supervisors rejected a fixed mindset or zero-sum beliefs, felt less powerful (or less powerful than their managers), perceived manager support for supervisory skills training, or felt more powerful than their workers (except in the case of turnover, which seemed to be affected differently by power gaps). See Table 3 below.

Table 3. Factors that disrupt and facilitate training effects.

Factors that disrupt training effects			Factors that facilitate training effects	
Factor	**Where effect is seen**		**Factor**	**Where effect is seen**
Endorsing a fixed mindset	Self-efficacy, worker idleness		Rejecting a fixed mindset	Self-efficacy, individuation, adjusted time to target, worker idleness
Feeling more powerful	Self-efficacy		Feeling less powerful	Outcome dependence, humanization
Feeling more powerful than managers*	Outcome dependence, beliefs about working conditions, humanization, defect rate, work piling up		Feeling less powerful than managers	Outcome dependence, humanization, beliefs about working conditions, worker idleness, work piling up
Unsupportive managers**	Turnover, worker idleness		Supportive managers	Worker idleness
Endorsing zero-sum beliefs	Defect rate		Rejecting zero-sum beliefs	Adjusted time to target
Feeling more powerful than workers	Turnover			

* With one exception: Feeling more powerful than managers facilitates the training effect for turnover
** With one exception: Having unsupportive managers facilitates the training effect for injury rates

In sum, training was most effective for supervisors who believe that intelligence is not fixed, and therefore were presumably more open to learning new skills and more likely to persist when challenged; for supervisors who rejected the idea that improvements in working conditions necessarily reduce factory performance; for supervisors who perceived manager buy-in for training and likely felt supported in implementing what they learned; and for supervisors who felt moderately but not extremely powerful (i.e., not more powerful than their managers). Having moderate power may have been the key to being both open to learning new skills and confident enough to implement them on the factory floor.

For most outcomes, gender did not moderate the effect of training; when it did, the effects were inconsistent. Training made more of a difference for female supervisors on adjusted time to target, but more of a difference for male supervisors on the frequency of work piling up.

Finally, the supervisor attitudes and factory context described above also affected outcomes independently of training. With few exceptions, more support from managers, lower zero-sum beliefs, more supervisor power, and lower cognitive load all predicted better outcomes. Although supervisor power had a negative effect as a moderator—training actually decreased self-efficacy for supervisors who felt most powerful—this effect decayed with time, and may have been caused by those supervisors' having their confidence shaken a bit by realizing that they did not know as much as they thought. Supervisor power did predict positive outcomes independent of training effects. See Table 4 below.

Table 4. Other factors affecting outcomes, independent of training.

Other factors affecting outcomes, independent of training (negative effects in italics)	
Factor	**Effect**
More support of SST from managers	Less dehumanization, more humanization, more positive beliefs about working conditions, greater outcome dependence, more perspective-taking, greater self-efficacy, *higher defect rate*
Lower zero-sum beliefs	Lower injury rate, less dehumanization, more humanization, more positive beliefs about working conditions, greater outcome dependence, *less individuation*
More supervisor power	Less work piling up, lower turnover, greater individuation, greater self-efficacy
Lower cognitive load	Less worker idleness, less work piling up, less dehumanization
Being male	More positive beliefs about working conditions
Less endorsement of fixed mindset	Less dehumanization, *less outcome dependence*
Greater manager power relative to supervisor power	More humanization, *less self-efficacy*

These analyses show that supervisory skills training did improve several types of factory outcomes, but also that factory context and individual supervisor characteristics must be taken into account. Future training programs could make use of these findings by, for example, increasing outreach to managers to develop their support for training, or including a short exercise to reduce supervisors' endorsement of a fixed mindset (see Dweck, 2006, for an overview, and Heslin, Latham, & VandeWalle, 2005, for a description of a 90-minute intervention for managers with effects lasting at least six weeks).

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