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Having a Voice in Your Group: Field Experimental Evidence on Behavioral and Attitudinal Changes

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**Having a Voice in Your Group:
Field Experimental Evidence on Behavioral and Attitudinal Changes**

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A DISSERTATION
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OF PRINCETON UNIVERSITY
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Abstract

One of the founding assumptions of social psychology is that groups influence human behavior—in particular, that an attempt to change a person's behavior will fail in the long run if it does not involve her group. There has been enormous research interest in how groups motivate behavior change, but debates exist about the types of group structures that motivate change, and causal evidence with real world groups is rare. I conduct two field experiments in different contexts and with different populations to test the influence of increasing the participatory nature of groups over long-term behavior and attitudes. Study 1 experiments with 65 work group (1,792 workers) in a multinational factory in China. Study 2 experiments with 32 staff groups (172 workers) in an elite university in the US. In each experiment, half of the groups were randomly assigned to a 20-minute participatory meeting once per week for six weeks, in which workers were invited to speak and supervisors mandated to listen. The other half of the groups continued with status quo meetings. Participatory meetings led to a 10.6% increase in treatment factory workers' productivity, which endured for 9 weeks after the experiment. I found that the frequency of voice within the group, rather than information or goals, drove the behavioral change. The treatment also led workers to be less authoritarian and more critical about societal authority and justice, and more willing to participate in political, social, and familial decision-making. Results in study 2 replicated such findings. This research highlights the power of participatory group dynamics in changing behavior and generalized attitudes across very different contexts, both for theoretical understanding and pragmatic intervention in behavioral and attitudinal change toward social institutions and hierarchy.

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1. Introduction

Ideas about the benefits of individuals' participation in their work groups, citizen groups, and religious groups have fascinated a wide range of scholars. Economists have been interested in the relationship between participation and economic development (Casey, Glennerster, & Miguel, 2012; Mansuri & Rao, 2012), organizational scientists in whether participatory groups are more efficient at their work (Hackman, 2002), and political theorists in the democratic effects of participation in civic groups (Pateman, 1970). Across different social sciences, participation can generally be defined as a process in which influence or decision power is shared between hierarchical superiors and their subordinates (Wagner & Gooding, 1987a; Arnstein, 1969).

There are a number of psychological mechanisms theorized to explain the benefits of participation in groups. First, participation may flatten hierarchy, by sharing influence, decision power, or more general involvement across group members. A less hierarchical group structure may reduce conflict among different group members and increase performance (Greer, Van Bunderen, & Yu, 2017), as intra group conflict is generally correlated with decreased performance (Bunderson & Reagans, 2011). Second, participation may boost performance through amplified information sharing (Locke & Latham, 2002). Research on participation and goal-setting suggests that performance gains may be driven by the informational, strategic, or coordination gains of the participatory decision making process (Vroom & Yetton, 1973; Hackman, 2002). Lastly, participation increases opportunities to voice one's perspective in decision-making processes (Lind & Tyler, 1988; Vroom & Yetton, 1973). Past research suggests that opportunities to voice one's perspectives in decision making processes enhance individuals' perception of fairness and justice in such processes (Lind & Tyler, 1988; Thibaut & Walker,

1978). The experience of having one's voice heard may be a motivational force for behavior change.

In general, there is mixed and contradictory evidence for the benefits of participation across domains of economic and political life (Mansuri & Rao, 2012, Karpowitz, Raphael, Hammond, 2009). In particular, the effects of participation in group life on individuals' behavioral outcomes, including worker productivity, are far from established. Empirically, research from organizational science about team participation, from cognitive psychology about particular forms of participation in goal-setting, and from social psychology about the structure of groups in relation to participation and productivity has produced debates and conflicting findings. In some cases, research finds positive effects of participation, broadly defined, on group members' behavior or attitudes (e.g. Schuler, 1980); in others, null and even negative effects (e.g. Schuler, 1980; Latham & Yukl, 1976; Richter & Tjosvold, 1980). The evidence specific to participation in work groups suffers from an additional problem because there are basically none robust causal studies of real world work groups. Most research on the effects of participation in work groups involves experimental studies with artificial laboratory groups or correlational studies in the field that cannot rule out alternative influences on individual behavior.

Value-based endorsements of participation is perhaps one reason that its popularity outreaches the evidential base. Participation is a value rooted in Western political ideology. The idea of participation is as old as that of democracy (Elster, 1998; Mansuri & Rao, 2012). Modern notions of group participation echo 18th and 19th century western philosophical thought embodied in writings from Rousseau and John Stuart Mill, who argued that participation serves an educational function and trains individuals to be responsible citizens (Pateman, 1970). The

idea of participation is largely celebrated in the Western world, to the extent that managers and academicians often advocate the use of participation, regardless of its (un)known practical benefits and challenges with implementation (Locke & Latham, 1979; Monge & Miller, 1986).

However, participation is not featured universally in how societies structure their work and institutions. In East Asian cultures, endorsement of strict social hierarchies, featuring minimal participation, is prevalent in philosophical literatures. For example, Confucianism denotes a basic set of moral principles for women (*Three Obediences and Four Virtues*), which emphasize absolute obedience for females to their male counterparts. Even though strict adherence to these behavioral codes have been abandoned, they have shaped East Asian cultures to the extent that harmony and obedience are prioritized over participation and dissent.

The effects of participatory group structures in the manufacturing sector in China may represent a boundary case of the effect of group participation on individual behavior—either of the minimal or maximum effect of participation. On one hand, participatory group structures may not work well because the idea of participation is not as welcomed in China and in the factory—particularly, management explicitly values authoritarian practices, and workers have little experience with participation. Moreover, China is a non-democratic state where participatory behavior and individual dissent is not singled out as a core social value. On the other hand, one could argue that participatory group structures may work particularly well because Chinese factory workers are not typically offered the opportunity and thus a small dose might have a large effect.

Following political theories of participatory democracy (Pateman, 1970; Rousseau, 1762) and psychological theories of group dynamics (Lewin, 1947) and flattened hierarchy (Greer, de Jong, Schouten, & Dannals, 2018), I predict that being invited to speak with one's group in the

workplace will change one's view of the group, of her workplace, and most of all will turn her group into a source of motivation to increase productivity. I predict these benefits may occur for a few reasons, all of which we can test in our experiment: group participatory structures may increase the flow of information among workers, or improve the quality or number of workers' production goals, or increase the frequency with which workers voice their individual thoughts or opinions ("voice"), which has known motivational benefits (Lind & Tyler, 1988).

My dissertation projects incorporate the advantages of both laboratory experiments and field studies by implementing two field experiments with existing work groups in two drastically different contexts. First, I conducted a field experiment in a large multinational textile factory in China. **Chapter 2** investigates the central question whether groups that encourage participation increase individuals' productivity and improve workplace attitudes. I also test why participatory structures work in this case, and measure the persistence of any changes. To increase participation, I adopt a classic participatory meetings paradigm (Lewin, 1947) in which workers are invited to speak while supervisors mandated to listen. We did not overhaul workers' group work environments; rather, we randomly assigned half of the work groups to experience a participatory meeting once per week for 20 minutes, while the rest of groups experienced their status quo work meeting. Status quo meetings in the Chinese factory under study, like many others, follow a hierarchical structure in which supervisors speak and workers listen. Because the intervention represents brief experiences with participatory structure and not a transformation in workers' engagement with their workplace, this test serves as a challenging test of the effects of participatory group structure and also a highly scalable solution, if it works.

Next, **Chapter 3** focuses on a different field experiment in the United States. I conducted this field experiment with academic administrative groups in Princeton University as a

conceptual replication of the Chinese factory experiment. I implemented participatory group structures—a 20-minute participatory meeting once per week for six weeks—in this context in which individuals are used to actively participate in their familial, social, and political life. I will test whether participatory group structures are beneficial to one's performance outcomes when participation is a core value in one's education system, political system, and everyday life.

Chapter 4 investigates the question how might experience with a participatory group structure at work shift not only worker productivity, but also worker attitudes toward participation in decisions about their livelihoods, and more generally, attitudes toward the society and politics.

Chapter 5 connects the findings from the previous chapters, and lay out some future directions for this line of research.

2. Lewin at work: Increasing Productivity Through Group Influence

2.1 Introduction

Human social groups exert powerful influence over their members' behavior (Allport, 1948; Tajfel, 1982; Burnes, 2007). According to Kurt Lewin, the founder of experimental social psychology, groups are so important that any attempt to change a person's behavior will fail in the long run if it does not involve her group (Lewin, 1947a). The success of "group carried" behavior change (Maier, 1965) is due to the regularity with which individual behavior is constrained by group pressure to fit in. Individuals who change outside of their group context are likely to experience pressure from their meaningful social groups to shift their behavior back to its original pattern (Lewin, 1947a). More generally, Lewin theorized that patterns of behavior are maintained by an equilibrium of forces from the person, her social group, and her larger social environment. Psychologists who understand this equilibrium may be able to shift long-lasting patterns of behavior, rather than influencing one-time deviations from this pattern (Lewin, 1943).

Armed with this theory, Lewin launched the study of groups as a motivator for behavior change (Lewin, 1947a). Although his creative field studies did not pinpoint the precise mechanisms by which groups could change individual behavior, his work formed the basis of the field of group dynamics, a term that he coined (Kippenberger, 1998). At the time, Lewin's move was revolutionary—to understand behavior by attending to group forces that were *external* to a person—since most of psychology focused on changing behavior by altering *internal* processes (Freud, 1962; Horney, 1950).

At present, social psychologists rarely study actual interacting social groups. Current laboratory paradigms, for example, ask individuals to imagine group identities or interactions (Kramer & Brewer, 1984; Williams, Cheung, & Choi, 2000; Prooijen, Bos, & Wilke, 2004).

When actual groups are assembled in the laboratory, over three-fourths come together on a one-time basis, meaning they have no past or future (Moreland, Hogg, & Hains, 1994; see also Fiske, 2014). These paradigms preclude the study of psychological pressures generated by the group and the group's larger social environment. Studies of actual interacting groups can be found in other areas of psychology, but the methods used are predominantly descriptive and rarely allow for causal inference (e.g., Hackman, 1990; 2002; for review, see Mathieu, Hollenbeck, Knippenberg, & Ilgen, 2017). These methods stand in stark contrast to the early decades of Lewinian research, in which experiments with face-to-face social groups uncovered powerful phenomena like group conformity (Asch, 1951), groupthink (Janis, 1972), minority influence (Moscovici, 1969), and group social norms (Sherif, 1936; Lewin, 1947b).

Today, Lewin's legacy is often associated with the idea that small changes produce big effects (Cohen, 2011; Thaler & Sunstein, 2009). This is only a partial reading of his body of work. His field interventions were designed to affect one particular force in the equilibrium of individual, group, and societal forces (such as a person who served as a "gatekeeper," a social group dynamic, or an institutional rule), so that he could observe whether a change in that force could shift the entire equilibrium (Lewin, 1947b). An intervention to affect that initial force, such as Lewin's group dynamics intervention, was often designed to be strong, not subtle. A modern psychologist might describe Lewin's interventions as "compound," meaning that they include not one but two or three steps, or that they activate more than one psychological process at a time. To the modern psychologist, these interventions may not seem "small," but they are small within Lewin's perspective on the general equilibrium of behavior.

The present work follows that tradition, and seeks to revive an interest in experimentation that is aimed at testing theories about the full ecology of forces driving individual behavior in the

world. We specifically study the paradigm of participatory group meetings, in which members of a work group are invited to discuss work challenges with one another and develop individual work goals. In their famous Harwood pajama factory demonstration (Marrow, 1969), Lewin and colleagues reported a substantial positive effect of these group-based participatory meetings on worker productivity. This work is now part of the canon of studies that changed the course of social psychology. However, a close examination shows that its lessons about participation may not be the most reliable; the work was conducted with a single factory work group that was selected for its high performance, and the data were analyzed without modern statistical tools.

By revisiting this study in a multinational apparel manufacturing factory in China, we aim to provide a statistically and methodologically powerful test of Lewin's foundational idea that modifying the participatory dynamics of groups can change and then sustain new behavioral patterns for their individual members. We also expand the scope of this idea by exploring attitudinal effects, possible mechanisms of change from participation to behavior, and by testing how long the effect, if any, can last. Our field experiment introduces participatory meetings to a random subset of 65 work groups over the course of 6 weeks. In total, the intervention involves 1,752 factory workers, with repeated behavioral and attitudinal measurement over the course of approximately 9 months. After testing for the behavioral effects of this intervention, we use quantitative and qualitative data to explore hypotheses about processes that could lead to behavior change: gaining information from the group, goal-setting, or having one's voice heard by the group.

2.1.1 Lewinian Theory of Group-based Behavioral Change

In his group dynamics work, Lewin sought to formalize a model that harnessed the powerful forces of a social group to change and sustain individual behavioral patterns. He

developed a 3-step model of individual behavior change, which described *unfreezing*, *moving*, and *refreezing* a behavioral pattern. For example, to decrease an individual's racially biased behavioral patterns, Lewin theorized it was first necessary to unfreeze the pattern through an emotionally stirring or unusual group-based event (Lewin, 1947b). He used group interventions called "T-groups," or training groups, in which emotional topics such as prejudice and discrimination were discussed with a moderator. Moving the behavioral pattern toward a new equilibrium was the next step, and Lewin theorized that the unfreezing event could itself create an opportunity for the individual to learn and change. For example, individuals might learn from other people in their T-group discussions, and desire to be more like them.

Lewinian theory posits that social groups are necessary to refreeze a person's new behavioral pattern. Individual actors might be able to unfreeze and move a person's behavioral patterns, but only social groups can sustain that change by reinforcing the new pattern (Lewin, 1947a, p. 36). For example, groups might adopt a new behavior alongside an individual or interpret the new behavior as consistent with their ongoing group identity (Lewin, 1947a, p. 199; Miller & Prentice, 2016). In addition to the T-group, Lewin developed another type of group intervention, which we term "participatory meetings¹," a type of group-based exercise used to unfreeze and move group members' behavior (Lewin, 1947b).

Participatory meetings: The Harwood studies. The set of classic studies that initiated social psychology's interest in the group as a motivator of behavior change were the Harwood pajama factory studies, conducted by Kurt Lewin and Alex Bavelas during the 1940's. Lewin was invited by his PhD student Alfred J. Marrow to visit the Harwood Manufacturing Corporation's new factory in Marion, a rural community in Virginia (Marrow, 1972; Burnes,

¹ Lewin called the paradigm the "group decision making" paradigm. We use a different label out of concern that their label is misleading, given that the group is not asked to make a collective decision.

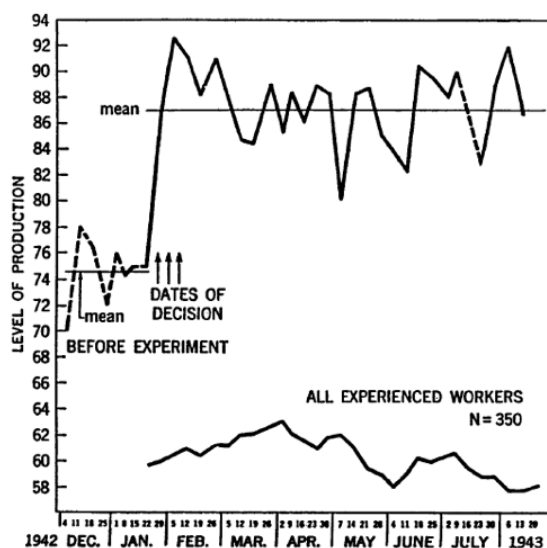
2007). The plant employed roughly 350 workers, who were mostly female, inexperienced, and uneducated, and whose productivity and morale were low.

Lewin and colleagues theorized that changing worker productivity would require the motivation of a face-to-face work group to “unfreeze” the current behavioral pattern, motivate a new pattern of behavior that led to higher productivity, and “refreeze” the new pattern. They designed a participatory meeting paradigm to test with factory sewing workers (Lewin, 1947b; Maier, 1965; Marrow, 1969, 1972; Burnes, 2007). In their study, one group of workers met with Lewin’s colleague Bavelas at the start of the workday. Bavelas encouraged the group to discuss the day’s work, barriers to their productivity, and possible solutions to these barriers. Finally, he encouraged each worker in the group to announce her own individual production goals in front of the group. Lewin described these meetings, which were held three times during an experimental period, as “democratic” (Maier, 1965). They stood in contrast to standard operating procedure at the factory, by which workers were subject to a more autocratic management style and followed the rules and decisions of the management (Bavelas, 1948; Lewin 1947a).

While Lewin did not spell out the three steps of change for this intervention, one imagines that the new grouping of workers and the shift from an autocratic to a democratic management style galvanized the workers and unfroze their existing behavioral patterns. Voicing one’s opinion about work, or learning new information from conversations with colleagues, may catalyze the motivation to change behavior. Finally, a regular implementation of these meetings or aspects of these meetings, like setting goals in front of coworkers, may help to “refreeze” the new and more productive behavioral patterns.

Their results were striking: workers in the participatory meetings increased their production sharply, compared to all other workers. This reported increase in behavioral productivity held steady over time, despite the fact that the treatment group's performance was already above the factory average (see Figure 1).

Figure 1. *The Demonstration Effect of Participatory Group Meetings on Sewing Machine Operators' Productivity (Lewin, 1947b)*. The study description was unclear about the duration and the end point of these participatory meetings. (Figure reproduced from Maier, 1965.)



These remarkable findings notwithstanding, several aspects of the study's setting and methods call into question whether its effects are causal or reliable. First of all, the participatory meetings treatment and researcher observation was applied to a single group of sewing machine operators, who were hand-picked by the factory as outstanding performers. In addition, features of the Harwood factory context may have been critical to the success of the treatment. For example, other experiments conducted on the same workers during that period may have been partially responsible for the effect (including stereotype reduction and sensitivity training reported by Lewin and colleagues elsewhere; Marrow, 1969; Patnoe, 1988). Furthermore, the head of the factory, Alfred Marrow, was Lewin's former student and a supporter of scientifically

grounded management, enthusiastic to transform the dynamics of the hierarchy from top to bottom (Marrow, 1969). In sum, the Harwood study of participatory meetings was a highly influential study of group dynamics and behavior. But upon close examination, it seems better understood as an inspiration to social science than as reliable evidence.

To our knowledge, the participatory meeting treatments have never been replicated or extended by other researchers, although they have been adopted by corporations who invited Lewin as a consultant following World War II (Marrow, 1969). However, there has been active empirical research into the broad and related topics of teams, participation, and hierarchy since Lewin's work. Despite this large literature, which we review below, the effects of participation in group life on productivity are far from established. Experimental studies with artificial work groups have provided mixed results, some of which contradict the optimistic findings from the Harwood studies. Actual work groups in the field are almost universally studied with correlational designs that cannot rule out alternative influences on worker behavior. The question of whether group participation drives productivity is still surprisingly open.

2.1.2 Teams, Participation, and Hierarchy

A full review of the enormous literature on teams, participation, and hierarchy is beyond the scope of this paper. Below, we summarize what evidence each of these research domains supplies in response to Lewin's original hypothesis that increased participation in work groups can lead to greater productivity.

Teams in organizations. While Lewin is regarded as the founder of small group research, research on group and team² dynamics has moved from social psychology to related

² Some scholars draw fine distinctions between small groups and teams, or partition groups into teams, task forces, and crews (e.g. McGrath & Gruenfeld, 1993). While these taxonomies can be useful, the distinctions between small

fields like industrial psychology, organizational behavior, and communications. There, team research has prioritized large-scale description or detailed case studies over causal inference (e.g., Allmendinger & Hackman, 1996; MacDuffie, 1995; for reviews, see Ilgen, 1999; McGrath, Arrow, & Berdahl, 2000). Specifically, the evidentiary base consists primarily of surveys and case studies³ of real world work teams, which preclude making causal inferences about the behaviors or attitudes that are examined.

A predominant goal of this research on teams is to develop normative models of productive teams (e.g. Hackman, 1990; 2002; see Kozlowski & Ilgen, 2006; Guzzo & Dickson, 1996 for reviews). Paralleling Lewin's focus on participatory, democratic groups, two active areas of research focus on autonomous work groups (AWGs, also known as semiautonomous, self-managing, self-directing, empowered teams) and quality circles. In AWGs, team members have control over when and how the work is done (Parker, Morgeson, & Johns, 2017). Relatedly, in "quality circles," team members are consulted for advice without having actual decision power (Cohen & Bailey, 1997). Both AWGs and quality circles highlight the role of autonomy and participation in job design, and are theorized to enhance team performance (Parker et al., 2017). However, systematic reviews reveal inconsistencies in outcomes for each type of team (Cohen & Bailey, 1997; Pasmore, Francis, Haldeman, & Shani, 1982; Parker, 2014).

A subset of research on teams focuses on team leadership, and categorizes leadership styles into two clusters: one that focuses on the tasks and goals (such as transactional, authoritative, and directive leadership), and the other that focuses on developing team members,

groups and teams are blurred in much of the empirical literature (Ilgen, 1999). In the current paper, we do not differentiate between groups and teams.

³ Sometimes the term "experiment" was used to refer loosely to change or manipulation of actual work activities rather than randomized control trials. For consistency, we refer to those studies as case studies.

(such as transformational, participative, and democratic leadership; Kozlowski, Gully, McHugh et al., 1996; Kozlowski & Ilgen, 2006). A focus on developing team members is the style most relevant to Lewinian participatory groups. However, the (primarily non-experimental) literature finds that developmentally focused leaders do equally well as task-focused leaders for encouraging team performance (Judge & Piccolo, 2004; Kozlowski & Ilgen, 2006); relatedly, a meta-analysis revealed no clear advantage of democratic or authoritative leadership style for promoting team performance (Gastil, 1994).

Participation. In a related literature, researchers have defined “participation” as a behavioral process in which influence or decision power is shared between hierarchical superiors and their subordinates (Wagner & Gooding, 1987a, p. 241). Defined psychologically, participation is a feeling of involvement in decision processes (Ritchie & Miles, 1970; Schuler, 1980; Miller & Monge, 1986). A weakness of the literature on participation in groups, however, is its lack of theoretical resemblance between any two studies that purport to measure or manipulate “participation.” The effects of participation, broadly defined, on group members’ behavior vary from positive to null and even some negative effects (e.g. Latham & Yukl, 1976; Schuler, 1980; Richter & Tjosvold, 1980).

According to meta-analyses, some of the inconsistent findings for the effects of participation on behavior can be attributed to methodological variations. Strong correlations between participation and behavior seem to rely on individuals’ self-reports: $r = .39$, while studies that measure participation or behavior with multiple methods reveal a small average correlation of $r = .12$ (Wagner & Gooding, 1987a; 1987b; Crampton & Wagner, 1994). Most research on the effects of participation involves experimental studies with artificial laboratory

groups or correlational studies in the field. Experimental research examining causal effects on objectively measured behavior is scarce, and often under-powered.⁴

One form of participation is goal-setting in a group context, which is an explicit part of the Lewinian model of participatory groups. Research on group goal-setting largely replicates findings from research on individual goals: certain types of goals promote performance (specifically, those that contain some degree of specificity and are difficult but achievable; Atkinson, 1957; Bargh, Gollwitzer, & Oettingen, 2010), as opposed to the group nature of the goal-setting. Research shows no difference between goals that are set by the group and goals that are assigned to the group, in terms of their effects on group performance (Locke & Latham, 1990, 2002; Locke, Alavi, & Wagner, 1997).

Hierarchy. Participation may flatten hierarchy, by sharing influence, decision power, or more general involvement across group members. A third related literature theorizes the causal effects of hierarchy on team performance in both directions: the functionalist perspective proposes that hierarchy increases team performance because of enhanced coordination processes (e.g., Halevy, Chou, & Galinsky, 2011; Magee & Galinsky, 2008; Gruenfeld & Tiedens, 2010), while the conflict perspective proposes that hierarchy decreases performance because of increased conflict among different group members (e.g., Bloom, 1999; Greer, Van Bunderen, & Yu, 2017; Bunderson & Reagans, 2011). Reviews report mixed results on the average effect of increased hierarchy (Greer, de Jong, Schouten, & Dannals, 2018), which has invited predictions about the heterogeneity of results (Anderson & Brown, 2010; Halevy et al., 2011; Tarakci, Greer, & Groenen, 2016). Relevant to the current study, two such predictions are that hierarchies

⁴ Most experiments manipulating participation are not sufficiently powered for, or do not analyze properly, group-based random assignment.

might enhance performance when the group is working on tasks that are simple and routine (Anderson & Brown, 2010) or when task structure includes some level of interdependency (Havely, et al., 2011). A recent meta-analysis on 54 prior studies found largely null results from those suggested moderators (i.e. complexity, interdependence; Greer et al., 2018).⁵

Like the other literatures reviewed, the empirical base of this debate about the effects of hierarchy consists mostly of correlational field studies and laboratory experiments with students (e.g. Greer & van Kleef, 2010; Tost, Gino, & Larrick, 2013). Thus, little causal evidence exists to attest to the abundant theoretical propositions about the impact of hierarchy on real world work groups.

Summary. Overall, the literature following the Harwood studies has surprisingly little to say about whether group participation of the kind encouraged in Lewinian participatory meetings can causally change individual and average group-level behavior. There has been enormous research interest and activity in the topics of teams, participation, and hierarchy, but many of the claims about the importance of participation in teams and groups have not been backed up by an empirical database that allow causal inference. Moreover, existing laboratory experiments do not provide evidence that takes into account the full set of individual, group, and environmental forces on behavior in which Lewin was interested. Our review indicates a need for experimental research with groups in the real world: to provide a test of causal direction, and to deepen our understanding of how behavioral patterns remain stable as a result of individual, group, and societal forces.

2.1.3 Hypotheses

⁵ Other moderators of hierarchy's effects on productivity included: aspects of the team structure like membership instability and skill differentiation, hierarchy mutability, and task ambiguity (Greer et al., 2018).

The current research provides a rigorous empirical test and theoretical extension of Lewin's original hypothesis, and addresses research debates both in and outside of social psychology on teams, participation, hierarchy, and behavioral change. Using Lewin and colleagues' original report as a guide, we design and implement a participatory meeting paradigm. Specifically, we test the effects of participatory meetings on workers' behavior and attitudes, and investigate the length and the processes of change. We propose the following specific hypotheses (all pre-registered at <http://bit.ly/2zWf3Ga>).

Behavior. First, what is the effect of participatory meetings on behavior? Like Lewin, we predict that participatory meetings will increase individual and group productivity, compared with groups who do not participate in participatory meetings. We treat worker productivity, retrieved from the factory's comprehensive production data, as the primary outcome in a direct replication of Lewin's original Harwood study.

Second, how long does the effect, if any, last? Are participatory meetings able to create a new behavioral equilibrium? Extending Lewin's original demonstration, we measured worker productivity during the 6 weeks of experimental meetings and up to 12 weeks after their cessation. Given the study's naturalistic setting, we can ask whether broader institutional forces in the workers' environment respond to the treatment in a way that sustains or resists a new behavioral equilibrium. For instance, the treatment may prompt factory management to assign more difficult work to groups with increased productivity, eventually erasing the treatment effect. Alternately, workers may quit more often in lower performing groups, falsely inflating the treatment effect over time. We collect data to test both possibilities.

Third, if behavior is successfully changed, what is the process through which it changes? Informational gain and voicing one's opinions are two potential mechanisms of participatory

meeting manipulations. In our study, we measure and relate informational gains and worker “voice” to changes in worker behavior. (While not pre-registered, we also test whether the nature of goals set in the participatory meetings relate to productivity.)

Information. In a workplace setting, supervisors deliver information, including goals, to workers, but this information may be amplified by discussion in a participatory meeting. Is an increase in information about the task responsible for increasing productivity? Research suggests that behavior changes may be driven by the informational gains of a goal setting process (Locke & Latham, 2002; Vroom & Yetton, 1973). Other research shows that goal setting does not have direct motivational effects, but indirectly bolsters performance by stimulating increasing informational discussions (Locke, Alavi, & Wagner, 1997; Latham, Winters, & Locke, 1994).

Voice. Do participatory meetings change behavior by increasing the number of times that group members’ voices are expressed and heard in the group? Even though past research has not affirmed a causal relationship between voice and productivity, related research shows that opportunities to voice one’s perspective in decision-making processes enhance individuals’ perception of fairness and justice (Lind & Tyler, 1988; Thibaut & Walker, 1978), and satisfaction with authority (Tyler, 1988; Hirschman, 1970; Adhvaryu, Molina, & Nyshadham, 2017). Control-mediated theories of procedural justice suggest having a voice is viewed as a form of control that can be used to achieve favorable outcomes (Thibaut & Walker, 1978). In participation research, voicing one’s opinions is suggested to be the most agentic and productive form of participation (Vroom & Yetton, 1973).

Attitudes. Lewin and colleagues did not investigate any effects of the participatory meetings on attitudes, such as whether workers felt more recognition, satisfaction, and

motivation in their workplace or beyond. We extend the scope of Lewin’s original work to predict that participatory meetings could affect a cluster of related worker attitudes and preferences that we term generally “workplace empowerment.” These include job satisfaction, sense of control, happiness and well-being (“individual empowerment”), and attitudes toward group life, friendship, and perceived care and respect from the management (“group empowerment”).

One possibility is that participatory meetings directly change attitudes. During the participatory meeting process, workers may gradually observe that “more people know my name,” “I’m part of and contribute to the performance of my work group,”⁶ and the like. Research shows a positive relationship between participation and workplace satisfaction (Miller & Monge, 1986; Guzzo & Dickson, 1996; Parker et al., 2017). Another possibility is that worker attitudes will change following behavior change. Consistent with research on self-perception and attribution (Bem, 1972; Ross & Nisbett, 1991; Paluck, Shafir, & Wu, 2017), attitudes such as job satisfaction and sense of control may be increased after workers observe themselves becoming more productive and making more money.

2.2 Method

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study. We pre-registered all survey items, item groupings, and analyses at the Open Science Framework (<http://bit.ly/2zWf3Ga>; see SM section E for complete survey).

⁶ Quotations taken from qualitative observations of our pilot work with the participatory meetings (see Method).

2.2.1 Experimental context

Our study took place at a factory in the Chinese branch of a multinational apparel manufacturer. It is a leader in the textile industry and a world-class manufacturer for textiles and garments. It is the world's largest original equipment manufacturer for clothing and is the main supply chain for Nike, Adidas, Carter's, Under Armour, etc. The factory is located in the city of Suzhou in Eastern China. The factory is built on the edge of the city far from the city center, in a location relatively inconvenient to reach by public transportation. Around half of the workers live in adjacent factory dormitories (assigned by groups) and another half commute to work every day.

The factory is divided into departments, such as cotton spinning, dyeing, and sewing. We selected all the sewing departments following our pilot study (described below) because employees in these departments work in groups. Sewing workers' monthly gross salary is a direct reflection of their individual productivity under the piece-rate payment scheme—the more each worker produces, the more she earns (workers are predominantly female). Each individual in a group works on her own task, which is related to her coworkers' tasks. For example, one worker may be in charge of sewing the sleeves of a hoodie while another is in charge of sewing the hood pieces. Groups who coordinate well (e.g., efficiently pass on finished pieces to the next worker) can work faster; however, coordination is not the only determinant of worker productivity. We observe heterogeneity within groups, where some workers are able to work faster and earn more than others (see Figure S1 and S2 in SM section H). Workers rarely transfer to a different group after they are hired, and each sewing group has its own supervisor who oversees group work.

As part of their normal work routine, all groups have a mandatory daily morning meeting, in which the supervisor summarizes the previous day's work performance, recommends individual and group working strategies, and announces goals for individual workers. All workers attend these group meetings.

2.2.2 Experimental manipulation

Observer condition (control). To control for work groups' awareness of the research study, each of the control groups was conspicuously monitored by an RA for the same number of meetings as treatment groups during the experimental period (throughout the paper, we refer to this condition as the observer or control condition). The RA did not encourage any change in the status quo meeting routine. She described herself as part of the research team visiting the factory to learn management strategies from the production floors. For the duration of the experiment, RAs silently observed as supervisors led the status quo morning meetings, which were typically 20-minute lectures on the group's production performance and on working strategies for the near future. The supervisor announced this week's order information and goals for each individual worker at the meeting's end in terms of the number of pieces each worker should complete, and wrote each worker's goal on a white board where all group members could see. In our pilot research, RAs recorded notes on these meetings, including time spent talking by the supervisor and by workers. Due to invariance in these descriptions (20-minute supervisor speech, and zero worker participation), we did not collect data on worker participation during the main experiment. RAs in the main experiment also reported zero worker participation in the control group meetings.

Participatory meetings (treatment). The basic structure of our participatory meeting mimicked Lewin's original design as closely as possible (see SM section A). An RA facilitated

the meeting for 20 minutes, in the presence of the group's supervisor. The RA encouraged all members of the group to participate in a discussion about production-related issues in the supervisor's presence. Supervisors were informed in advance that they should refrain from speaking during the discussion, and in particular that they should not interrupt the workers. During the discussion time, workers were specifically encouraged to share work experiences and production strategies for their own tasks, such as how to prepare piecework, where to put finished or unwanted pieces, or the best way to pass finished pieces to the next worker in group. RAs were trained to redirect any non-work-related conversation to production-related issues. RAs set the expectation for the meetings at the start of the first treatment meeting by saying:

“We encourage everyone to speak up. Say whatever's on your mind about your work, such as issues yesterday or in the past week, the difficulties you have at work, or things you think will help you and others. I may ask some questions, and there are no right or wrong answers. Whatever you share will be helpful for us and for the group.”

Following this discussion, the RA announced the week's order information, so that workers could set their individual production goal for the week. The participatory meeting ended with the RA encouraging each group member to voice her own goal for the week.⁷ Each worker received a piece of paper so that she could think of a goal and write it down, and then announce her goal to the group when it was her turn. Workers gave their papers to the RA at the end of the meeting. RAs also completed a descriptive rating sheet of each meeting directly following its completion, which we used to track possible mechanisms of change (see below).

⁷ In the pilot participatory meeting the goal setting was structured differently because individual goals were not relevant for each type of group involved in the pilot. Instead, workers individually responded to the RA's question about whether in general they would commit to a goal to work harder and more precisely.

Table 1 illustrates the structure of the treatment and control meetings. The informational structure of the treatment and control meetings was the same, but the structural difference was that the information and goals came from the supervisors in the control status-quo meetings while they came from the workers in the treatment participatory meetings.

Table 1.

Comparison of a Treatment Participatory Meeting and a Status-quo Control Meeting.

	Participatory meeting	Status-quo meeting (with observer)
Before 7:40am	People gather	People gather
7:40-7:57am	Group discussion of production and work strategies	Supervisor lecture on group's production and work strategies
7:57-8:00am	Workers set individual goals in the group	Supervisor set goals for individual workers

2.3 Pilot study and field observations

2.3.1 Sample

Before the main experiment, we conducted in-depth qualitative field observation in the experimental sites in December 2014, and then conducted a pilot study with seven treatment groups from different departments ($N = 145$ workers) one year prior to the main experiment. The field observation and pilot experiment had three goals: 1) test different strategies to encourage workers to communicate, given that this was an unusual event for them, 2) observe how our translation of a Lewinian participatory meeting structure would be experienced by different kinds of work groups at the factory, given that the factory feature more vs. less intensely collaborative work and larger vs. smaller groups⁸, and 3) collect salary data before and after the participatory meeting trial run, to address factory management's concerns that a change in the status quo

⁸ We excluded flat-wage (as opposed to piece rate) workers whose salary did not depend on their productivity ($N = 474$), who mostly did logistic jobs such as cleaning, moving materials, and accounting.

meeting structure could hamper productivity (albeit in a very small sample).⁹ We invited work groups from the cutting, embroidery, sewing, packing, and quality control departments. Unlike workers in the sewing groups, workers in embroidery and quality control groups do completely independent work and do not coordinate with group members. The group size varied from 4 workers (for packing work groups) to over 30 workers (for quality control work groups). Instead of holding six weekly meetings as planned for the main field experiment, the pilot study held four total weekly participatory meetings over the course of one month. The participatory meeting procedure was similar to the method described above. Our only dependent variable for the pilot study was workers' productivity.

The number of workers involved in the pilot treatment was 145 (7 supervisors excluded). Participants (individual factory employees) were unpaid volunteers who were recruited by researchers. Participants all gave informed consent to participate in a weekly short meeting for one-month conducted by researchers from a prestigious American university. They were informed that there would be no reward or penalty of any form from either the factory or the researchers if they chose to participate or not to participate in the study.

2.3.2 Pilot results

We compared productivity for workers in the seven groups that were (non-randomly) assigned to the participatory meetings to the productivity of workers in all remaining factory work groups who did not hold participatory meetings ($N = 140$ groups from 19 departments, or

⁹ Separately, we tested survey questions using “cognitive interviewing” (CITE) for appropriate language and phrasings and comprehensions. No systematic data are available from these pilots because the wording was changed from data collection to data collection.

2,202 workers), over the course of one month. Pre-treatment productivity between these two conditions was not significantly different, $p = 0.30$ (see SM section H).

We did not find any evidence that the participatory meetings decreased productivity (our partnering factory's main concern). By contrast, we found a statistically significant increase in monthly worker productivity among the workers in the pilot participatory meetings condition ($\beta = 35.78$, Robust $SE = 1.39$, $CI = [18.17, 53.39]$, $p = .025$; measured by piece rate salary, see main experiment Method for detail), controlling for productivity during the month prior to the treatment. This productivity increase translates to 35.78 Yuan (\$5.76), extra earned for the month, or 0.73% more earnings for the workers who were in the four participatory meetings over the course of the month. This difference is estimated to be stronger when an additional month's pre-treatment productivity is covaried, as pre-registered (Table 2).

Table 2.

Participation in Pilot Participatory Meetings Increased Workers' Productivity (Yuan).

Productivity (in Yuan)	(1)	(2)
Participatory meetings	35.78* (1.39)	49.08* (3.27)
Baseline productivity (1 month prior)	0.46* (0.0082)	0.430** (0.0027)
Baseline productivity (2 months prior)		0.19* (0.0067)
Constant	2,344* (40.88)	1,533** (21.22)
Department fixed effects	YES	YES
Observations	2,225	2,103
R-squared	0.31	0.36

Note: Robust standard errors clustered by work group in parentheses. The dependent variable is number of Yuan earned in one month during treatment. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

2.3.3 Pilot discussion

Based on our qualitative observations in the pilot (see SM section B), we concluded that the main field experiment should sample medium-sized groups (eliminating small 4-person cutting groups and over 30-person quality control groups), to best enable worker participation in discussion (see SM section B for full qualitative analyses). Our qualitative results also suggested that sewing workers were able to set individual goals at the end of the meeting, as did participants in Lewin's original demonstration.

The positive and statistically significant increase in productivity was encouraging for the research design and for the factory. Our pilot helped us to test and fine-tune the participatory meeting paradigm, which we had replicated to the best of our ability from Lewin and his

colleagues' scattered writings. In our main experiment, we tested our full set of hypotheses with a larger and fully randomized sample of work groups.

2.4 Main experiment

2.4.1 Sample and method

We administered the participatory meetings treatment for a total of six weeks, with 18 weeks of follow-up survey and productivity measurement.¹⁰ A total of 65 groups (1,752 workers, none of whom participated in the pilot) from 7 sewing departments participated in the experiment; 31 groups (863 workers) were randomly assigned to the participatory meetings condition and 34 groups (889 workers) were randomly assigned to the observer condition. Below, we exclude data from 141 workers who quit their job during the 6-week experimental period, and from 78 workers who joined groups following the experiment. Our results are insensitive to the inclusion of either and both of these categories of workers (as detailed in SM section F).

2.4.2 Group randomization

We randomly assigned groups from all 7 sewing departments (65 groups; $N = 1,752$) to either participate in a weekly morning participatory meeting (*participatory meetings condition*) during the time of their usual meeting, or have an observer attend the usual morning meeting (*observer condition*).¹¹ To randomize, we used a matched randomization procedure to balance

¹⁰ As requested by factory management, we commenced the experiment in one department one month prior to the rest of the sample. The content and length of the experiment in this first department remained exactly the same as the other departments, displaced in time by one month. This department is included in analysis per usual, adjusting for date. We were not concerned about spillover of treatment effects from this early-start department to other departments, given our observation of minimal contact among workers in different departments.

¹¹ We have few concerns about spillover of treatment to control groups. The building structure and work schedule allow for little communication between sewing production floors or among work groups. Workers spend most of their time in their own group's working area during work, and have little communication with other groups during and after work.

and minimize observable differences between the groups *ex ante*. We applied a non-bipartite matching scheme (Beck, Lu, & Greevy, 2015), matching groups within each department on their group size, average worker productivity, normal working hours, and overtime working hours. We also took into account qualitative comments from departmental supervisors on the leadership style of each supervisor to fine-tune the group matches prior to randomization (see SM section C for matching code). When groups were paired within departments, we randomly assigned one group in each pair to the participatory meetings condition, and the other to the observer condition. Three departments had an odd number of groups; we assigned the one group that did not receive a match to the observer condition, as desired by the factory. (Results are robust to the exclusion of these three groups; see Table S4 in SM section D.)

Individuals in all groups provided informed consent during a recruitment phase one month before the experiment's commencement (we did not observe any refusals during the recruitment phase). With the cooperation of the factory's human resources managers, researchers made oral public announcements in the sewing departments to invite workers to a study called "worker experience in the factory." Workers were specifically told that "researchers are not part of the factory but are coming to learn management practices and offer new technologies on work-related issues. All of you are invited to take part[...]Participation is completely voluntary."

2.4.3 Experimental procedure

Once per week for six weeks, during the traditional morning meeting slot, Chinese research assistants (RAs; all female) facilitated the weekly participatory meetings or served as observers. Each type of meeting lasted for roughly 20 minutes before workers began their workday. RAs were graduate students from a local university, trained by the first author to follow a detailed experimental protocol. RAs were unaware of specific research hypotheses. By

the end of the experimental period, treatment groups ($N = 31$) had experienced six weekly participatory meetings and control groups ($N = 34$) had experienced six weekly meetings with an outside observer.

2.4.4 Behavioral outcome measures

Productivity rates from factory data. Workers in the factory are paid by piece-rate. The factory uses advanced technology that counts each worker's finished pieces by machine in real time, providing objective, precise, and accurate measures of worker production. Piece quality is taken into account: inspected pieces that do not meet the factory's quality standards are not counted and are passed back to individual workers to repair.

We used two types of data to evaluate workers' productivity, our primary dependent variable. We used gross salary, which is important from the workers' perspective, and the market value of a worker's production, which is important from the factory's perspective. All data were acquired from the factory's human resources department.

2.4.5 Survey data collection

One week after the experimental intervention had ended, a team of 11 RAs and I collected individual surveys from all 1,752 members of the 65 sewing groups in the study. We repeated this survey procedure three weeks later, a full month after the intervention ended. Since a considerable part of the factory worker population is illiterate, a survey administered in writing was not feasible. Prior in-depth cognitive interviews (with factory workers who were not involved in the experiment) guided the development of our survey instrument, which combined oral questioning in a group setting with workers checking boxes on individual answer sheets.

Due to workers' time constraints, we conducted the survey during the 1-hour meal time and provided a free meal as incentive. On average, 4–5 groups (not segregated by treatment

assignment) gathered for a mealtime survey session. Researchers read each survey question aloud, and participants marked their responses on answer sheets (featuring places for “yes” or “no”, or numbers from 1–6 on a Likert scale of agreement that was explained in advance). This procedure obviated the need to read or write Mandarin characters.

Workers were assured that there were no right or wrong answers, that the survey was confidential, and specifically that researchers would not share individual answers with the factory management. Participants did not write down their names; researchers linked survey responses to participants’ factory data with a small code on the answer sheet, which corresponded to a coded sheet of names maintained by the researchers.

Researchers described the survey as “part of a research project that investigates worker experiences in the factory.” Participants were encouraged to interrupt the researchers for question clarification, but were not allowed to look at each other’s answer sheets or discuss their answers during the session. To further ensure confidentiality, participants put their completed answer sheets in a sealed envelope and put their envelope in a box with all other surveys. As agreed in advance of the study, no identifiable survey data were shared with the factory.

Wave 1 post-intervention survey: One week later. The “Wave 1” survey, one week after the end of the experiment, measured multiple work-related attitudes and preferences (survey completion rate = 83.79%; 93.78% female; see Table S5 in SM section E). The survey consisted of five parts: individual job-related attitudes (*individual empowerment*), individuals’ attitudes and feelings toward the groups (*group empowerment*), mechanism measurement (*information gain and voice*), demographic information, and the manipulation check. Both exploratory and confirmatory factor analyses supported these pre-registered item groupings.

Attitudes: Individual empowerment. Eleven questions elicited different aspects of workers' individual feelings of empowerment at work. We created separate pre-registered indices of specific topics, including job satisfaction (e.g., “all in all I am satisfied with my job,” and “being frustrated comes with this job,” reverse-coded), perceived sense of control at work (e.g., “there is really no way I can solve all the problems I have at work,” reverse-coded), happiness and well-being at work (e.g., “did you experience happiness during a lot of the day yesterday?”), and sense of individuation (measured by one item: “most of the people in my group know my name”).

Attitudes: Group empowerment. Thirteen questions investigated aspects of workers' sense of empowerment as a group. We created pre-registered indices of specific topics, including attitudes toward their work groups (e.g., “I feel I am really part of my group,” “I have confidence and trust in my coworkers”), friendships at the factory (e.g., “I feel lonely in this factory”), and perceptions of their work group's importance at the factory (e.g., “The factory cares about and respects us”).

Mechanism: Information gain. We pre-registered two possible mechanisms of change: informational gain and voice in the work group. Two survey questions elicited workers' informational gain: “how many different gestures or strategies are you aware of that you can use to do your task?”, and “do you know who to ask for if your machine needs fixing during the order switch?” For a group-level assessment, we used research assistant estimates of the average percentage of time each treatment group spent during their participatory meetings on concrete problem solving, and a rating of how many people were involved in that discussion (1 = *almost no one was engaged*, 4 = *almost everyone was engaged*).

Mechanism: Voice. To measure voice in the work groups, we used RA ratings of how much time the group spent discussing non-informational or strategic issues, specifically: raising awareness of existing problems (without problem solving), and non-production-related issues such as food in cafeteria. For each topic, research assistants also rated how many people were involved in these discussions (1–4, same scale). In addition, we recorded two negative measures of voice: the frequency of supervisors interrupting worker discussion, and the frequency of supervisors scolding the workers (expressing negativity), and one positive measure (encouraging her or his workers to speak out) on a 1–3 scale (“never,” “a few times,” “more than several times”).

Goal-setting. One hypothesis that we did not pre-register is the idea that the content or specificity of the goals set by workers in their meetings might influence productivity. We can measure the content of the treatment workers’ goals because they wrote down their personal goals on a paper before announcing them to the group; RAs collected these papers so that team leaders would not take them and use them as reminders outside of the context of the participatory meeting. Because workers frequently did not write their names on the papers, these goals are more reliably recorded at the group and not the individual level.

Demographics. Toward the end of the survey, we measured standard demographics such as age, gender, marital status, and rural or urban origin. We also asked workers to self-report their productivity.

Manipulation check. We pre-registered two survey questions as experimental manipulation checks. The first asked to what extent workers were discussing their job with coworkers; the treatment condition should have increased this discussion a significant amount.

Second, we asked: “do you know some information about the order you are working on (e.g., order amount, deadline)?”

Wave 2 post-intervention survey: Four weeks later. To examine whether any changes endured beyond the end of the experimental period, we repeated a shortened version of Wave 1 four weeks after the end of the intervention with all participants, using the same procedure (we added a set of new measures about authority and justice, discussed in a separate working paper). We selected fifteen questions in total from the attitudinal constructs in Wave 1 to assess whether any attitudinal effect would sustain over a longer period of time (survey completion rate = 84.07%; 93.49% female; see SM section E).

2.5 Results

2.5.1 Analysis strategy

We tested the effects of participatory meetings, on worker productivity during the intervention and up to 12 weeks after, and survey responses one week and four weeks following the intervention, using linear fixed effects regressions.

Linear regressions used fixed effects for the seven departments in which the 65 groups were nested, a dummy variable indicating treatment, and a vector of pre-treatment individual covariates to improve efficiency (including pre-treatment productivity, work experience, and education). Robust standard errors clustered by group accounted for residual covariance on the group level. Thus, to estimate the average productivity for an individual worker i of group j ,

$$P_{ij} = \beta_0 + \beta_1 D_{ij} + \gamma_1 \mathbf{Z}_{ij} + \gamma_2 \mathbf{H}_{ij} + g_j + \mu_{ij}. \quad (1)$$

The regression coefficient β_1 represents the average causal effect of the treatment on worker productivity, as measured by P_{ij} (averaged over the first 6 weeks following the start of the intervention). D_{ij} refers to a binary variable of experimental manipulation randomly assigned to

the participants, in which $D_{ij} = 1$ refers to the participatory meeting condition and $D_{ij} = 0$ refers to the control condition. $\mathbf{Z}_{ij}$ is a vector of individual-level worker characteristics that are unaffected by the treatment such as work experience and education. $\mathbf{H}_{ij}$ denotes a vector of controls for pre-treatment productivity, broken up into 6-week averages. g_i denotes a departmental fixed-effect, and μ is a zero-mean error term, assumed to be mutually independent across (but not within) groups. As two additional robustness checks, we also estimate productivity outcomes using group averages ($N = 65$) and group sums ($N = 65$), detailed in SM section D (results are consistent).

2.5.2 Balance test, manipulation check, and RA meeting descriptions

We used a logistic regression with pre-treatment characteristics to predict treatment assignment. These characteristics included both worker demographics and work group characteristics (baseline productivity, gender composition of the group, worker experience, age, and education). The balance test revealed no significant observed differences on average between groups in the participatory meetings and observer condition (see Table 3).

Table 3.

Balance check. The balance test showed there was no significant differences between participatory meetings and observer condition for any pre-treatment characteristics. Omnibus $p = 0.40$.

	<i>Condition Assignment</i>
Education	0.303 (0.219)
DeptA3	-0.647 (1.164)
DeptB3	-0.532 (1.218)
DeptC2	-0.501 (1.193)
DeptC3	-0.326 (1.180)
DeptD2	-0.048 (1.181)
DeptD3	-0.614 (1.243)
Work experience	-0.095 (0.052)
Baseline productivity (first 6-week period)	-0.0002 (0.0002)
Baseline productivity (second 6-week period)	0.0002 (0.0002)
Gender	0.363 (0.304)
Age	-0.024 (0.015)
Constant	0.852 (1.344)

*Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.*

I was on site to observe that all participatory meetings took place and that observers attended regular meetings for control work groups. Further, I used the reports that RAs filled out after each participatory meeting to verify that procedures had been carried out as expected and to monitor for any adverse events.

Two manipulation checks in the first survey wave each supported the hypothesis that the participatory meetings were carried out as planned. Workers in the participatory meetings condition reported more frequent discussion with group members about how to do their job well ($M_{PM} = 2.60$, $SD = 0.25$; $M_O = 2.39$, $SD = 0.26$; $\beta = 0.24$, $CI = [0.16, 0.33]$, $SE = 0.04$, $p < .001$; using a scale from 1 = *never* to 3 = *a few times per week*). Also, workers assigned to participatory meetings were more likely to report knowing order amount and deadlines for the production order they were working on, which were announced in the participatory meetings so that workers could form individual goals (66.42% for treatment and 56.01% for control; $\beta = 0.49$, $CI = [0.09, 0.90]$, $SE = 0.21$, $p = 0.017$; using a binary scale 1 = *yes* and 0 = *no*).

From RAs' weekly reports on the participatory meetings, we found that workers in these meetings spent on average 43.5% of discussion time on concrete problem-solving ($SD = 22.97\%$), 22.0% of time on raising awareness of existing problems (without problem solving; $SD = 13.66\%$), and 7.0% on discussing non-production-related issues such as food at the cafeteria ($SD = 11.80\%$). Factory supervisors who were present at all meetings on average rarely interrupted the discussion ($M = 1.65$, $SD = 0.67$), reprimanded workers during discussion ($M = 1.32$, $SD = 0.54$), or encouraged workers to speak out ($M = 1.22$, $SD = 0.49$; for ratings of 1 = *never*, 2 = *once or twice*, 3 = *many times*).

2.5.3 Worker productivity

During the six weeks of the treatment, workers in the participatory meetings condition were significantly more productive than workers in the control observer condition. This difference is large in monetary terms, and is robust to different measures of productivity (Table 4). Treatment workers earned on average 592.30 Yuan (\$87.74) more than the control workers over the course of six weeks ($CI = [142.50, 1042.10]$, $SE = 229.31$, $p = 0.010$). The participatory meeting effect represents a 10.63% increase from the prior six weeks in workers' average gross salary, relative to control workers. In addition, treatment workers produced 368.76 Yuan (\$54.63) more goods in market value (measured by raw amount produced) than control workers ($CI = [56.35, 681.16]$, $SE = 159.26$, $p = .021$). This difference, which is of primary interest to the factory, represents an 8.68% increase in average raw amount produced. Thus, participatory meetings increased productivity from both the workers' and factory management's perspective.

Long-term Worker Productivity. The productivity gains among workers in the participatory meetings condition relative to observer condition endured for 6 weeks after the experiment, a time in which none of the groups experienced a participatory meeting. For the groups previously treated with the participatory meetings, we observed sustained effects on both gross salary and raw amount produced. Workers in the participatory meetings condition earned 532.72 Yuan (\$85.20) more than workers in the observer condition ($CI = [180.22, 885.22]$, $SE = 179.70$, $p = 0.003$), a 10.74% increase in average gross salary relative to control. Furthermore, treatment workers produced 351.28 Yuan (\$56.97) more goods in market value than control workers ($CI = [79.92, 622.65]$, $SE = 138.34$, $p = 0.011$), a 9.41% increase in treatment workers' market production relative to control. Again, results are robust to using departmental fixed effects and baseline covariates. The statistically significant treatment difference endured until 9 weeks following the intervention (Figure 2).

Figure 2 also displays well-known seasonal trends in production patterns (Levitt & List, 2011): productivity is expected to rise steadily from February to early summer, in a post-Chinese New Year production surge, and decrease from June to October, a lackluster season for apparel manufacturing. Given these trends, the figure suggests that the intervention stabilized the treatment groups' productivity, preventing it from decreasing as otherwise would be expected from seasonal patterns of production.

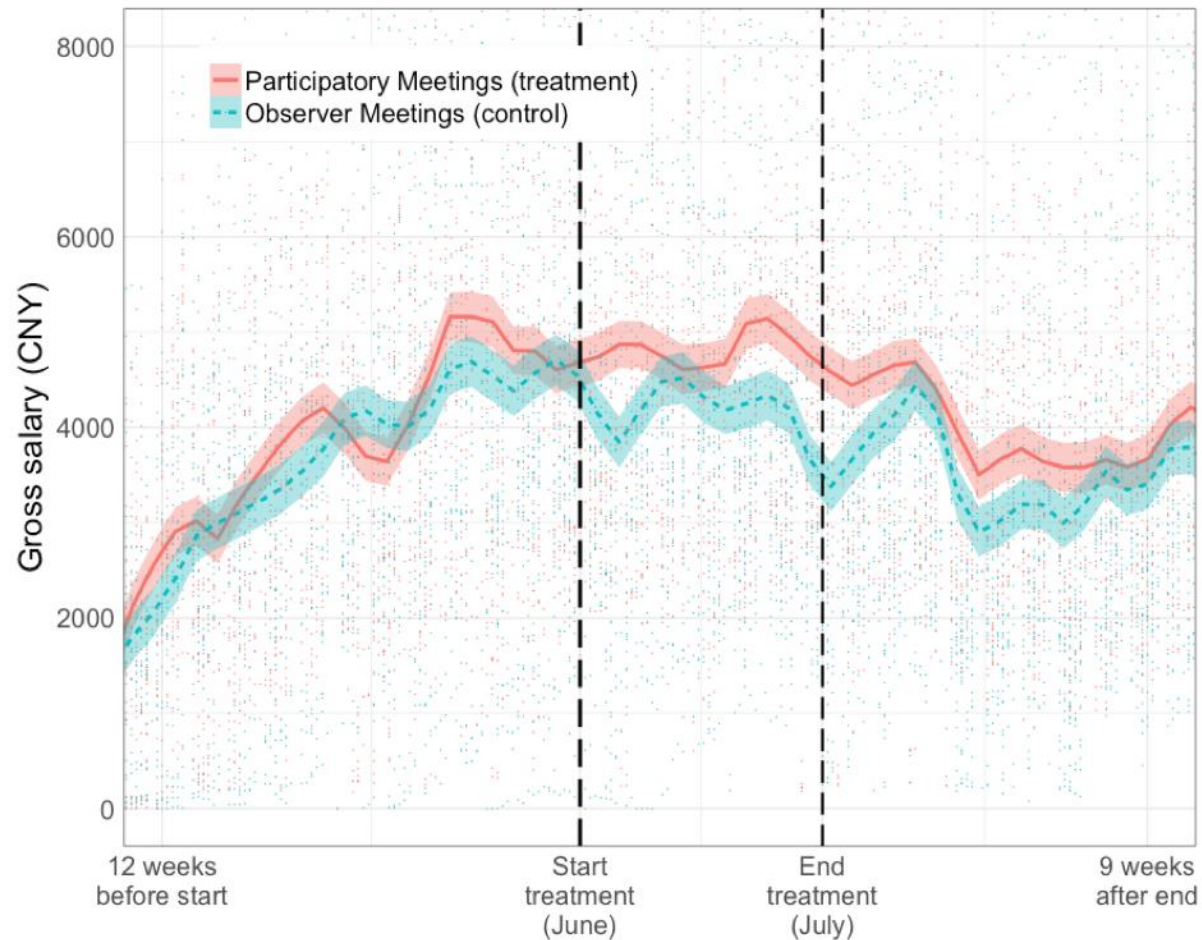
Interestingly, these behavioral results were not mirrored by participants' self-reported change in productivity. In Wave 1, participants' self-reported productivity ("I think my productivity has increased over the past month" on a 1–6 scale) showed no differences between treatment and control workers. All workers rated their productivity as having moderately increased ($M_{PM} = 4.56$, $SD = 0.47$; $M_O = 4.45$, $SD = 0.40$; $p = 0.32$).

Table 4. *Productivity Change During the Six-Week Experiment Period and Sustained Productivity Change After the Experiment.*

	<i>Dependent variable: Productivity (in Chinese Yuan)</i>							
	Experimental period				Long-term			
	Gross salary (1)	Gross salary (2)	Market value (3)	Market value (4)	Gross salary (5)	Gross salary (6)	Market value (7)	Market value (8)
Participatory meetings	584.39*	592.30**	362.97*	368.76*	491.17*	532.72**	320.94*	351.28*
	(259.12)	(229.31)	(178.00)	(159.26)	(206.21)	(179.70)	(159.10)	(138.34)
Work experience		42.87		32.20		63.72**		50.44**
		(30.78)		(20.72)		(23.63)		(17.83)
Education		184.19		119.92		-109.21		-95.51
		(118.97)		(87.89)		(180.72)		(146.69)
Baseline productivity (first 6-week period)		0.44***		0.40***		0.33***		0.34***
		(0.06)		(0.05)		(0.06)		(0.05)
Baseline productivity (second 6-week period)		0.04		0.06		0.13*		0.14**
		(0.05)		(0.05)		(0.05)		(0.05)
Departmental fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Constant	6,310.16	4,043.36	4,800.59	3,086.77	7,656.74	5,860.00	5,761.08	4,229.34
	(466.48)	(411.36)	(345.24)	(299.23)	(279.19)	(379.50)	(205.49)	(297.80)
<i>N</i> (clusters)	65	65	65	65	65	65	65	65
<i>N</i> (individuals)	1611	1490	1611	1490	1561	1440	1561	1440
Control mean estimate	6320.64	6455.84	4902.48	5008.78	5648.30	5603.92	4522.36	4503.07

Note: The comparison condition to the participatory meetings is the observer condition. Models include full-time sewing workers paid by piece-rates. Supervisors ($N = 65$) and staff members ($N = 76$) whose productivity cannot be determined by either gross salary or market value were excluded in the productivity data analysis. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Figure 2. *Worker Productivity, Comparing Groups Using Participatory Meetings and Observer Meetings, Across a 27-Week Period.*



Note: Fitted lines with 95% confidence intervals chart the complete time series of worker productivity in terms of gross salary for the participatory meetings (treatment) and observer (control) work groups—specifically, the immediate effect of the participatory meetings that emerged following the first week of intervention, and the duration of the effect for 9 weeks following the cessation of participatory meetings. Each red and blue dot represents the sum gross salary for a participating work group (red for treatment and blue for control) for one day.

2.5.4 Process of change

We explored the possibility that informational gain and having a voice in the group mediated worker productivity by analyzing RAs' weekly ratings of the participatory meeting discussions, including how much time the group spent discussing information about the job, or how often workers spoke up in general. These ratings were used to predict group productivity over the time course of the intervention using weekly time lag regressions on each week's rating, and to predict post-treatment group productivity using regressions that averaged RA ratings over the entire intervention period. We also used worker self-reports on informational gain from survey wave 1.

No effect of informational gain or goal content. In survey wave 1, work groups assigned to the participatory meetings condition did not appear to have an informational advantage over work groups assigned to the observer condition. There was no difference in the number of gestures or strategies workers reported knowing for their sewing tasks ($M_{PM} = 1.87$, $SD = 0.41$; $M_O = 1.82$, $SD = 0.34$; $p = 0.53$) and there was no difference in workers' knowledge of whom to contact if their machines were broken ($M_{PM} = 0.59$, $SD = 0.23$; $M_O = 0.49$, $SD = 0.26$; $p = 0.42$; using a scale with 1 = yes and 0 = no). Workers' self-rated knowledge also did not correlate with their concurrent productivity at the time of Wave 1, or predict their productivity in the six weeks following Wave 1.

We next analyzed the variability among treatment groups' discussion of work information in their meetings, to see whether more discussion of task-related information leads to greater productivity. Specifically, we used the combined measure of RAs' estimates of the proportion of the meeting spent on problem solving and the proportion of workers participating in problem solving to predict group productivity (results were consistent for each estimate).

Problem solving was not linked to higher group productivity, using a weekly lag of ratings and productivity (gross salary) over the course of the intervention ($\beta = 14.87$, $CI = [-12.94, 42.68]$, $SE = 14.09$, $p = .29$). Problem solving averaged over the treatment period also did not predict productivity in the six weeks following the intervention. In fact, we found that problem solving was negatively related to productivity (gross salary) six weeks later ($\beta = -655.31$, $CI = [-1359.63, 49.02]$, $SE = 339.62$, $p = .07$).

We also analyzed whether group-level variance in productivity became smaller over time, which we might expect if workers were learning from one another and strategically coordinating around their goals. We found no difference in group-level variance in productivity comparing treatment and control groups (mean SD : $M_{PM} = 1512.27$, $SD = 547.01$; $M_O = 1449.79$, $SD = 385.96$; $p = 0.52$). However, individual levels of productivity across time became more stable for treatment workers (mean SD : $M_{PM} = 64.21$, $SD = 12.70$) compared with control workers ($M_O = 68.65$, $SD = 15.05$; $\beta = -5.72$, $CI = [-9.83, -1.62]$, $SE = 2.09$, $p = .006$). Thus, participatory meetings made individual but not group productivity more stable.

In terms of goals, RA records show that the workers always stated goals in terms of the number of pieces they wanted to complete each day. To test whether the size of the goal, specifically the number of pieces that the worker wanted to complete, drove the current results, we correlated the size of workers' goals with their productivity for that week. The number of finished pieces the workers set as a goal imprecisely captures goal difficulty—some workers might work on a simpler task that can be completed at a faster rate, for example. Without knowing the difficulty of a hood vs. a sleeve, we found a small but nonsignificant correlation between goal content and productivity ($\beta = 0.05$, $p = 0.07$). Furthermore, we found that treatment workers' goals, in terms of numbers to produce did not rise significantly from week to week ($\tau =$

-13.40, $p < 0.01$), using an augmented Dickey-Fuller joint probability test of the distribution of their actual goals against a non-stationary stochastic distribution of goals over time). The change in goal content from week to week also did not predict worker productivity within the treatment condition ($\beta = 0.05$, $p = 0.09$).

Voice in the participatory meetings correlates with productivity. Our data suggest that one important mechanism of the participatory meetings treatment was the workers' experience of speaking up in their group, or "voice." For participatory meeting groups, voicing opinions about production or non-production issues (without problem solving) both predicted higher group-level productivity during the intervention period ($\beta_{\text{production}} = 56.74$, $CI = [0.42, 113.89]$, $SE = 27.03$, $p = .02$; $\beta_{\text{non-production}} = 64.60$, $CI = [25.62, 103.59]$, $SE = 19.71$, $p = .001$). Voicing opinions also predicted higher group-level productivity in the six weeks following the treatment ($\beta_{\text{production}} = 1294.18$, $CI = [373.11, 2215.24]$, $SE = 429.44$, $p = .009$; $\beta_{\text{non-production}} = 751.31$, $SE = 313.02$, $p = .03$).

Next, we examined whether supervisors' encouragement of workers' voice during the meetings similarly affected productivity (RAs' weekly responses to: "did the supervisor—" "...intervene during the discussion?", "...scold the workers?", and "...encourage or praise the workers when they spoke out?"). We found that supervisors' encouragement and praise of voice positively predicted subsequent group productivity during the intervention ($\beta = 65.75$, $CI = [0.74, 130.76]$, $SE = 32.93$, $p = .047$) and six weeks following ($\beta = 1739.60$, $CI = [560.61, 2918.60]$, $SE = 568.50$, $p = .006$). By contrast, supervisors' interruption of the discussion (discouragement of voice) negatively predicted group productivity during the intervention ($\beta = -67.09$, $CI = [-123.95, -10.23]$, $SE = 28.78$, $p = .021$), although this effect did not endure

following the end of the intervention. We did not find an effect of supervisors scolding the workers.

2.5.5 What eventually attenuated the effect?

We found that the boost to treatment workers' productivity endured for 9 weeks after the end of the intervention. In other words, the intervention had enduring effects, but did not permanently "refreeze" the new levels of productivity. One obvious reason for effect attenuation was that on the individual and group level, the intervention was no longer present. Since treatment workers were no longer experiencing the participatory meetings treatment, we should not expect the treatment effect to linger much longer. However, as we study this behavioral equilibrium in the real world, we pose two hypotheses about this lack of permanent change, which we were able to test with the data at hand.

Hypothesis 1 (group-level): The makeup of the groups changed. Worker turnover happens on a regular basis, and so it is possible that workers who quit shifted group dynamics and thereby affected group productivity. In order to determine whether quitting affected group productivity over the long run, we first examined whether workers quit treatment and control groups at comparable rates. In the first 12 weeks after the end of the experiment, 190 (21.57%) control workers in the observer condition quit, while 124 (14.29%) treatment workers in participatory meetings quit. A logistic regression revealed that control workers were more likely to quit their jobs than treatment workers, $\beta = -0.52$, $CI = [-0.85, -0.18]$, $SE = -0.17$, $p = .002$.

Next, we tested whether there were differential effects of quitting on group productivity. We calculated the rate of quitting for each treatment and control group, and interacted the quitting rate with treatment assignment to predict average group productivity in the first two 6-week periods after the end of the experiment. We did not find any effect of quitting on group

productivity. While the treatment seems to have reduced quitting, quitting within a group is not likely responsible for the fact that the treatment did not last beyond 9 weeks.

Hypothesis 2 (institutional-level): The factory adjusted to changes and allocated difficult tasks to treatment groups. At higher levels of management, the factory accepts orders from companies all over the world. Middle management then assigns these different orders to groups. In theory, random assignment of treatment should address possible systematic differences in middle management's task assignment for treatment and control groups. However, one could predict that after the intervention began, middle management might have observed higher levels of productivity among treatment groups and consequently allocated more difficult tasks to these high-performing groups. This may explain why the treatment effect attenuated after 9 weeks—because of institutional adjustment to real changes. To test this hypothesis, we first compared the unit price (an indicator of difficulty) of each order that was assigned to the treatment and control conditions after the start of the experiment, and second, tested whether order's unit price was related to group productivity.

We found no difference in the unit price of the assigned order piece between treatment and control groups after the start of the experiment ($M_{PM} = 2.29$, $SD = 1.46$; $M_O = 2.36$, $SD = 1.47$; $p = 0.40$). Moreover, unit price did not consistently predict group productivity ($\beta = -0.49$; $p = 0.59$). In other words, this particular institutional “force” shaping group behavior does not seem responsible for the attenuation of the treatment effect after 9 weeks.

Summary. The frequency of speaking up in the group, or voice, positively predicted treatment workers' increase in productivity. We did not find evidence that any difference in information or goal setting that resulted from the meetings drove increases in productivity. The effects of participatory meetings did not endure longer than 9 weeks after the end of the

experiment; group-level worker turnover and institutional-level task adjustment are unlikely contributors to the attenuation of these treatment effects.

2.5.6 Individual and group empowerment

Attitudes: Individual and group empowerment. Workers assigned to the participatory meetings reported higher individual and group empowerment, as measured by several indices. For the group of indices that we pre-specified as indicating individual empowerment (see Figure 3), treatment workers reported significantly more job satisfaction ($\alpha = .67$; $M_{PM} = 4.47$, $SD = 0.34$; $M_O = 4.28$, $SD = 0.34$; $\beta = 0.17$, $CI = [0.01, 0.33]$, $SE = 0.08$, $p = .03$), and more sense of control at work ($\alpha = .32$; $M_{PM} = 3.97$, $SD = 0.32$; $M_O = 3.68$, $SD = 0.30$; $\beta = 0.25$, $CI = [0.12, 0.38]$, $SE = 0.06$, $p < .001$), compared with workers in the observer condition. One exception was happiness and well-being ($\alpha = .62$), where the difference between treatment ($M_{PM} = 4.08$, $SD = 0.33$) and control workers ($M_O = 3.92$, $SD = 0.40$) was in the expected direction, but not significant ($p = 0.10$).

Workers in participatory meetings expressed higher aspects of group-based empowerment as well, including favorable attitudes toward their work group, affiliation with the group and trust and confidence in group members, than workers in the observer condition ($\alpha = .80$; $M_{PM} = 4.67$, $SD = 0.23$; $M_O = 4.54$, $SD = 0.31$; $\beta = 0.13$, $CI = [0.004, 0.27]$, $SE = 0.07$, $p = 0.043$). Treatment workers also felt less lonely ($M_{PM} = 2.99$, $SD = 0.48$; $M_O = 3.31$, $SD = 0.44$; $\beta = -0.31$, $CI = [-0.51, -0.11]$, $SE = 0.10$, $p = 0.003$) and reported that the factory cared about and respected them to a greater extent than workers in the observer condition ($M_{PM} = 3.60$, $SD = 0.41$; $M_O = 3.11$, $SD = 0.63$; $\beta = 0.48$, $CI = [0.23, 0.73]$, $SE = 0.13$, $p < .001$).

Longitudinal Attitude Change. In survey wave 2, four weeks after the end of participatory meetings, we repeated the manipulation check question. Even though they no

longer took part in participatory meetings, treatment workers reported more frequent discussion with group members about how to do their job well than did the control workers ($M_{PM} = 2.45$, $SD = 0.20$; $M_O = 2.23$, $SD = 0.30$; $\beta = 0.24$, $CI = [0.13, 0.35]$, $SE = 0.06$, $p < .001$).

Just as they did in Wave 1, workers assigned to participatory meetings reported more positive attitudes in the indices indicating individual empowerment. Treatment workers reported more job satisfaction ($M_{PM} = 4.06$, $SD = 0.29$; $M_O = 3.85$, $SD = 0.27$; $\beta = 0.22$, $CI = [0.09, 0.36]$, $SE = 0.07$, $p = .001$), and more sense of control at work ($M_{PM} = 3.77$, $SD = 0.33$; $M_O = 3.53$, $SD = 0.39$; $\beta = 0.27$, $CI = [0.11, 0.43]$, $SE = 0.08$, $p = .001$) compared to control workers. Again, there was no difference in reported happiness and well-being between treatment ($M_{PM} = 3.55$, $SD = 0.13$) and control workers ($M_O = 3.52$, $SD = 0.18$; $p = 0.79$).

For the group of indices indicating aspects of group-based empowerment, treatment workers continued to report that the factory cared about and respected them more ($M_{PM} = 3.42$, $SD = 0.40$) to a greater extent than the control workers ($M_O = 3.11$, $SD = 0.58$; $\beta = 0.34$, $CI = [0.13, 0.56]$, $SE = 0.11$, $p = 0.002$). Even though treatment workers expressed more favorable attitudes toward group life and felt less lonely in Wave 1, by Wave 2 there was no difference in attitudes toward their groups ($M_{PM} = 4.19$, $SD = 0.27$; $M_O = 4.08$, $SD = 0.34$; $p = 0.41$) or feelings of loneliness ($M_{PM} = 3.08$, $SD = 0.48$; $M_O = 3.25$, $SD = 0.41$; $p = 0.13$).¹²

Because we tested the average treatment effects on multiple attitudinal indices, we conducted a joint significance test against the null hypothesis that the coefficients of average treatment effects from each attitudinal treatment regression are jointly nonsignificant. As

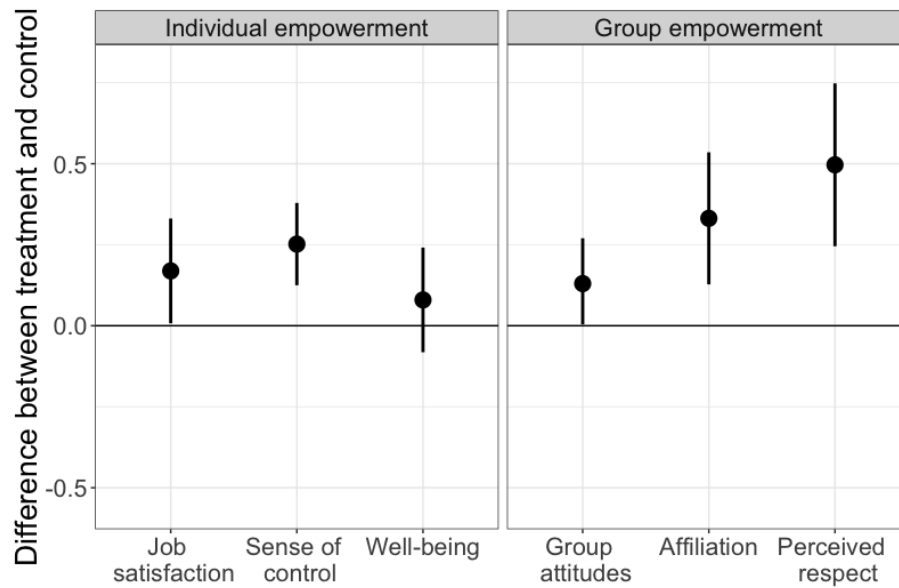
¹² During Wave 2, 78 new workers participated, having arrived after the end of the participatory meetings treatment (fewer than 10% of our sample). When their responses are added, our significant treatment results in Wave 2 are unchanged (see SM section F). This could reflect their socialization into more productive groups; however, their small number may preclude finding a real significant difference between the group of new workers and treated workers. Because we do not know how the factory decided to assign new workers to groups, we leave their responses out of the main analyses.

predicted, we rejected this null hypothesis: we find a jointly significant difference of the average treatment effects between workers in the participatory meeting and observer condition, $F(1, 58) = 7.24, p < .001$. This joint difference was also significant without any covariates $F(1, 63) = 6.59, p < .001$.

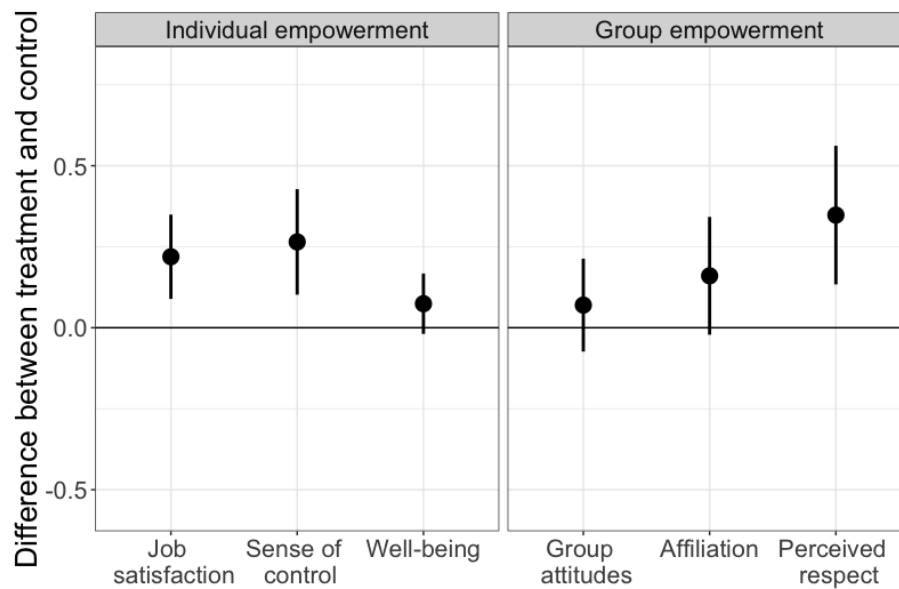
Summary. The above evidence supports our hypotheses that participatory meetings would increase productivity as well as workers' individual and group-based sense of empowerment, including job satisfaction, sense of control, perception of respect and care from factory management, and favorable attitudes toward their work groups. The effects of participatory meetings on productivity were sustained six weeks after the intervention's end, and the effects on attitudes were sustained at least four weeks after. These results were robust to a series of sensitivity checks (see SM sections D and F).

Figure 3. *Difference of Work Related Attitudes Between Treatment and Control Workers, Measured One Week and Four Weeks Following the End of the Experimental Intervention.*

a.



b.



Note: Solid dots indicate the average treatment effect of the participatory meetings on each attitudinal index. Error bars represent 95% confidence intervals of the estimates.

2.5.7 Relationship between productivity and attitudes

We also predicted that productivity and attitudes might correlate with one another, for instance if higher productivity promoted perceived workplace empowerment outcomes. Our experimental design cannot distinguish whether the intervention directly influenced both attitudes and productivity, or whether it directly influenced one (e.g., productivity), which influenced the other (e.g., attitudes). Instead, we explore the correlations between attitudes and productivity in the same survey wave and between waves. Specifically, we use productivity and change in productivity during the intervention to predict attitudes in survey wave 1 at the end of the intervention, and we use attitudes measured in survey wave 1 to predict productivity measured 6 weeks after the intervention during survey wave 2.

Of all the attitudinal constructs, only job satisfaction was positively (though not significantly) related to productivity; moreover, this result only held for measured changes in productivity and not absolute levels of productivity. Among treatment workers, while the results were not statistically significant, the more their productivity increased during the intervention, the more job satisfaction they reported immediately afterward ($\beta = 0.28$, $CI = [-0.04, 0.59]$, $SE = 0.16$, $p = .08$). The pattern did not hold for control workers. Further, among treatment workers, job satisfaction at the end of the intervention significantly predicted future increases in productivity six weeks later. The more job satisfaction treatment workers expressed in survey wave 1, the more their productivity increased six weeks after that survey ($\beta = 0.05$, $CI = [-0.0009, 0.10]$, $SE = 0.025$, $p = .05$). We did not find a significant relationship between absolute levels of productivity or changes in productivity and individual or group-based worker empowerment.

2.6 General discussion

The present field experiment provides the first clear evidence supporting Lewin's original idea that participatory meetings—a group process in which workers discuss their work with one another in a non-hierarchical manner—can change behavioral patterns, specifically increasing productivity. During the 6-week experimental period, treatment workers on average increased their productivity by 11%, or \$88 above their previous productivity. This increase in productivity persisted for over two months after the cessation of the participatory meetings. Workers assigned to participatory meetings also reported higher workplace empowerment, including job satisfaction, sense of control, and more favorable attitudes toward their coworkers, and were less likely to quit their job. Increases in this workplace empowerment endured for at least one month after the meetings ended.

Because we conducted the experiment in the workers' actual workplace—scheduling the participatory and observer meetings during the factory's regular meeting times and measuring productivity in the form of workers' real salary—our results speak to the power of these group interactions measured against the pre-existing equilibrium of forces acting on workers' behavior. For example, our results show that discussing work with one's coworkers for 20 minutes each week can improve average worker behaviors and attitudes across various work tasks and supervisor styles, and even when some workers leave and new group members arrive. Our results also show that this intervention is a meaningful change, despite the fact that these workers are already highly motivated to earn as much money as possible to send home to their families. The participatory meetings also positively impacted the workers despite (or perhaps because of, as we will discuss below) a lifetime spent toward the bottom of the social and workplace hierarchy in the factory and in society more generally.

2.6.1 Mechanisms of Change

Why did these meetings have such a strong and enduring effect on behavior and attitudes? Lewin proposed participatory meetings as a tool for “unfreezing” and “refreezing” behavior change without testing any specific mechanism. But his insights suggest participation as the key ingredient of the participatory meetings. What exactly does participation entail? We tested multiple avenues but found no evidence that the information workers gleaned from their discussions or the goals that they set¹³ were responsible for their change in behavior or attitudes. However, we found that voice, measured in multiple ways as the frequency with which workers spoke in front of coworkers and supervisors, was correlated with the behavioral changes we observed.

Specifically, the amount of time that treatment workers spent talking to one another (excluding informational problem-solving time), and the extent to which most workers in the group spoke, was correlated with the group’s increase in productivity. Additionally, the more that supervisors encouraged discussion and refrained from interrupting discussion, the more productive their group. All these group level analyses suggest that the more often workers voiced their perspectives, the more productive they were. To this point, it is notable that we observed a spike in productivity among treatment groups after the first participatory meeting of the intervention (see Figure 2). The first meeting’s discussion was devoted to familiarizing the workers with the meeting structure and encouraging workers to introduce themselves to one another—it did not involve any problem solving with work tasks. The surge in productivity

¹³ We can compare the main experiment’s analysis of goal setting results to those of our pilot study, which used a slightly different participatory meeting format that elicited a general goal: workers were asked to respond to a question of whether they planned to “work harder this week.” The pilot observed significantly greater productivity after workers committed to this nonspecific goal. Given these two pieces of evidence, it might be possible to think of the meeting’s goal-setting activity as another form of voice, since it required each worker to speak to the group. In other words, the importance of the goal setting activity may have been that it ensured each worker’s participation in the discussion.

following this meeting supports the perspective that it was the meetings' facilitation of workers' voices, rather than the informational content of their discussion, that motivated their higher productivity in the short and longer term.

Attitude and behavior change. Extending beyond Lewin's predictions, we predicted and found changes in workers' attitudes as a result of their new participatory group discussions. It is tempting to assume that the immediate and long-term increases we identified in individual and group empowerment were responsible for workers' increased productivity. However, we find little evidence that attitude change preceded or even correlated with behavior change. Workplace empowerment and productivity increased at the same time for treatment groups, but did not correlate, with one exception: job satisfaction weakly correlated with productivity.

According to previous research on the relationship between workplace performance and workplace attitudes or "morale" (Kahn, 1960), this lack of an association is not surprising. The relationship between workplace attitudes and behavior has been controversial over decades of research (Petty, McGee, & Cavender, 1984). Despite numerous theoretical positions on its directions, strength, and moderators, the nature of the attitude-productivity relationship remains unclear. Thus, our conclusion resembles those of classic reviews on the attitude-productivity link: that "there is no systematic relationship between productivity and such morale variables" (Kahn, 1960, p. 279).

Other evidence from this study suggests that workers' attitudes did not change through the same process that changed behavior. In general, we found workers' actual experiences, not their reports of their experiences, predicted behavior change. For example, workers' actual proportion of speaking time correlated with group productivity, but not workers' self-reports of their voice in the workplace and in their family life. Similarly, we also found no correlation

between actual productivity increase and perceived productivity increase. Workers in both treatment and control groups self-reported increases in productivity. That workers' perceptions of their own voice do not predict behavior is somewhat surprising, given a rich literature on procedural justice that connects attitudes toward authority with individuals' perception that they have a voice in their relationship with authorities (Tyler, 2014). However, this literature offers very little evidence on the correlation between perceived voice and actual, rather than self-reported, behavior.

One possibility is that attitudes changed as a function of experimenter demand. Perhaps workers in the participatory meetings perceived that they should respond in a more empowered "Western" style for a study that they understood to be backed by a "well-known university in the United States." We think that this is unlikely, since: 1) control participants were given the same background about the study, 2) control groups were also "observed" each week by an RA who observed and took notes, 3) treatment and control workers took their surveys in the same room, and 4) workers knew their confidentiality was protected during the survey session. Finally, it is reasonable to think that workers were more concerned about the opinion of their employer, rather than the opinion of outside researchers. In this case, it is questionable whether the workers would perceive that reporting higher levels of individual empowerment—feelings of control at work in particular—would be desirable to factory management.

In sum, the attitude changes that we track open up questions for future research to explore. It is likely that we did not capture certain individual or group-level processes that can help explain why the participatory process shifted workers' attitudes about their workplace, their decision-making power, and their work groups. Future studies could collect more observations of individuals discussing and working in their groups. Our findings demonstrate the promise and

power of this kind of qualitative investment, for understanding more of this intervention's mechanisms and for aiding in interpretation of quantitative results as well.

This study speaks to some of the debates and methodological gaps in the literatures on teams, participation, and hierarchy. First, the results show a clear average benefit of participation and of flattened hierarchy, in a situation in which the tasks are simple and routine, and interdependent (Havely et al., 2011; Anderson & Brown, 2010; Greer et al., 2018). This finding contradicts some of the current ideas about the role of hierarchy and participation for group productivity. Second, this study stands apart as one of the few well-powered, cluster-randomized field experiments testing causal relationships between participation and productivity. In this respect, the study provides a template for future research. Future research should continue testing the generalizability of these participatory meetings, a topic we address below.

2.6.2 Future Directions

Contextual variations. Our present findings suggest other important next steps, including but extending beyond future research that investigates the mechanisms of participatory group influence. Our experiment, situated in a naturalistic field context, presents a set of findings that are ultimately about change within a specific equilibrium of individual, group, and institutional forces—a particular context. Reflecting upon which aspects of this particular context might have facilitated or limited the influence of participatory groups leads to interesting future questions.

For example, we did not find that the information shared during the workers' discussion affected worker productivity. But perhaps information sharing would matter in other workplaces, in China and elsewhere, where worker tasks are less differentiated than those in this study's factory. For groups in which all members are working on the same problem, or are discussing

more general challenges like multi-tasking or workplace communication, information sharing might increase productivity. Information sharing might also be important for non-work groups discussing social problems like discrimination, where sharing strategies for recognizing and preventing negative stereotypes or using unbiased language could be broadly helpful for all.

By contrast, it is possible that the present study's context exaggerated the importance of group members' voice in the process of change. Both the institutional setting, which featured a strict hierarchical relationship between supervisors and their young female workers, and the Chinese national setting, which features discouragement of social and political dissent, minimize regular opportunities to express opinions for workers in our sample. Future research can test whether the opportunity to express oneself is as important a mechanism in other institutional and societal contexts, where group members' voices are more routinely recognized or encouraged.

Perhaps a factory setting in China is precisely the context where a participatory meeting would present the sharpest contrast to the established equilibrium of behavior, and thus have the greatest effect. While this is possible (though new field experimental research from the United States suggests participatory meetings have a similar effect as in China; see Chapter 3), we point out that Kurt Lewin and colleagues developed the participatory meetings in the United States to change American workers' behavior, in a factory headed by a CEO who was open to experimental management practices. Thus, perhaps it is not the sharp uptick in worker participation that is responsible for improved productivity, but rather the installation of regular, organized opportunities to participate, since that is the common factor between these two dramatically different settings.

Intervention variations. The current project follows Lewin's legacy of studying a "compound" intervention to test a hypothesis about the balance of forces driving individual

behavior in a natural environment. As foreshadowed in the introduction, the intervention can be described as compound because it included multiple elements that a psychologist would theorize as a potential mechanism of change—group discussion, an altered role for the supervisor, and an altered source of goal-setting. From other perspectives, describing the participatory meetings as compound may seem strange; in the policy world, for example, these meetings at 20 minutes once per week with no material incentives involved would be deemed “light touch” and possibly too minor to create change. Interestingly, our factory collaborators believed our intervention was “too subtle to have any effect.”¹⁴ Whatever the perspective, we argue that psychologists should return to the study of these relatively more compound interventions, because they are theoretically designed to test hypotheses about the interplay of individual and social forces.

Thus, we anticipate but caution against interpreting the participatory meetings manipulation as a “messy” independent variable that needs to be reduced to its constituent parts. Not very much could be stripped from the current intervention’s proceedings without changing its meaning and significance as a work meeting. For example, would a meeting without a factory supervisor seem like a meeting to the workers? The reductionist nature of the intervention, if it were broken apart into separate components, could change its meaning to participants, perhaps rendering it incomparable to the original intervention. Taking a laboratory manipulation directly into the field or transplanting an intervention from one context to the next without adequately translating so that it carries the same social and cultural significance would likely inhibit the processes we wish to study (Gantman et al., 2018). In sum, field interventions are often compound, but not messy. They are built to make sense to human social groups. Rather than

¹⁴ In field interviews with department supervisors both before the intervention and even after the intervention, we heard that the participatory meetings were not likely to change anything, since none of the information brought up by the workers would be completely novel, and the individual goals voiced out would not deviate much from the goals set by the supervisors.

reducing a compound intervention into separate elements, one way to further this research would be to conduct a series of experiments with compound participatory meeting interventions. Each experiment could vary one component of the meeting, or the setting and population (for an example of this technique, see Dunning et al., in press).

We hope that this research helps to reinvigorate the study of social groups in their natural environments. This approach allows for the study of how an equilibrium of forces—from the individual, the group, and from institutions and broader society—maintains long-term behavioral patterns. These types of studies have the potential to reveal behavior change mechanisms with long-term real-world effects.

3. Increasing Productivity and Morale at Work: The Participatory Meeting Experiment at Princeton

3.1 Introduction

After observing positive results demonstrated in Chapter 2 (i.e. more worker productivity and favorable work attitudes in a Chinese factory), I replicated the original experiment in a different setting in the United States. Specifically, I replicated the study with academic departmental staff groups at Princeton University. The aim of the replication was to broaden the investigation to other contexts and test whether teams of knowledge workers would react to participatory group structures in ways similar to workers in more task-based settings.

3.2 Method

3.2.1 Group randomization

During sample recruitment in summer 2017, we invited academic managers (i.e. group supervisors) from all the 69 academic departments' administrative staff groups to two breakfast recruitment events, describing this study as part of a "Campus Behavioral Science Initiative" that is supported by the University central administration. During the recruitment meetings, we introduced the researchers and the study itself. The purpose of the study was described as to motivate behavior change and increase productivity in academic departments. For the managers who were not able to attend the breakfast recruitment events, we paid individual visits to their departments to explain the project, presenting them with the exact same information as in the recruitment breakfast. Participation of the study was completely voluntary. No monetary incentives were provided. Participants include the academic managers in each department and

their staff members. Forty academic managers agreed to participate in the experiment during the recruitment phase.

We used a nonbipartite matching scheme to minimize observable differences between treatment and control groups *ex ante*. Specifically, we matched the 40 consented departments into pairs based on their academic division (natural sciences, social sciences, humanity, or engineering), program type (academic departments or interdisciplinary centers), staff and faculty headcounts, and initial level of enthusiasm in our study (indicated by whether they RSVPed in our recruitment breakfast events). Once all departments were matched (20 pairs), we randomly assigned one group in each pair to participate in a weekly morning participatory meeting (*participatory meetings* or *treatment condition*) and the other to continue with their status-quo meetings (*control condition*). Eight departments withdrew from our experiment post-randomization¹⁵. The final sample consists of thirty-two academic departments' administrative staff groups or 172 individual staff members participated in the study (78% female, 22% male; 80% identified as White or European-American; mean age = 50 years, ranged from 25 to 88 years). All participants signed informed consent prior to the commencement of the intervention.

Each group was comprised of an academic manager (the supervisor) and staff members who directly report to the manager (the workers). Supervisors and workers provided written informed consent before the experiment's commencement. The median size of the administrative group was 6. The staff members' work is relatively independent, including job roles such as graduate and undergraduate administrators, finance managers, and event coordinators.

¹⁵ Common reasons for quitting were department staff changes or having a busy semester.

3.2.2 Experimental procedure

In the treatment participatory meetings condition, we changed the 20-minute staff meeting once per week for six weeks. We recommended supervisors to hold these treatment meetings on Monday or Tuesday at a fixed time window during the six-week experimental period. Supervisors were trained to follow a detailed participatory meeting guide to facilitate a discussion on work related issues (see SM section M for the participatory meetings training guide). The participatory meeting structure largely mimicked those in the Chinese factory study (Chapter 2). We provided a broad weekly topic for the supervisors to steer the discussion, e.g. how do you get things off your checklist (week 2 topic), communicating mistakes (week 3 topic), etc. Managers could adjust these discussion topics to their particular departmental needs and schedule. In the first participatory meeting, supervisors set expectations and encouraged team members to bring up and discuss their own work challenges, share effective strategies, and problem-solve barriers. In the end, each individual group member voice out their own work goal in front of the group in terms of what they want to get done or make progress toward. They were encouraged to be specific even if not everyone knows what they were talking about. No outside observer attended these participatory meetings.

In the control condition, staff groups continued with their status quo meetings, depending on each department's needs and schedule. We did not intend to make any change to their status quo meetings.

In the first week of the experimental period, a member of our research team paid a 15-minute visit to each participating department to solicit feedback from the department managers on the best behavioral metrics for productivity, such as number of grants submitted and conferences organized, which are heterogeneous across departments. Departmental productivity

data will be obtained from central campus sources. Research assistants also took measurements on general departmental climate, including the geographical centrality of the staff offices, how close staff sit with each other, and general impressions of the interaction patterns with the managers during these visits.

Two weeks after the end of the intervention, all participants in the treatment and control conditions completed a survey measuring indices of specific topics such as job performance, job satisfaction, and attitudes toward their groups.

3.2.3 Performance measures

Measuring knowledge workers' "productivity"¹⁶ could be a challenge as there was no countable products or tangible monetary values associated with their labor. From extensive discussion with and feedbacks from various administrative sources, we came up with three different types of performance measurements: administrator ratings, self-reported performance, and administrative behavioral metrics.

Administrator ratings. One month after the end of the intervention, we collected performance ratings from seven administrators who have frequent and multiple contacts with a majority of academic departments' staff across campus. The raters were representatives from university management divisions including Office of the Dean of the Faculty, Finance and Treasury, Office of the Dean of the Graduate School, Office of the Dean of the College. They rated all the 65 participating and nonparticipating departmental staff teams' overall performance with one item "How effective and efficient are the administrative staff in this academic unit?" using a 5-point Likert scale from 1= "Almost never" to 5 = "Almost all of the time," with an open option "Not enough information to know" if the rater was not familiar with any department.

¹⁶ The staff objected using the term "productivity" as they felt they were not producing widgets as the factory workers.

Self-reported performance. Five questions elicited staff's self-reported performance, particularly related to the efficiency of group communication, which they identified as one of the most important aspects of job performance before the start of the intervention. We adapted the performance measures from the annual survey of the University's Human Resources Office (e.g. "To what extent do you think your team communicates well?" from 1 = "Not well at all" to 7 = "Very well"). See SM section L2 for the full survey.

Administrative behavioral metrics. We collected a series of behavioral measures from a central campus administrative source (Princeton Administrative Data in Research, known as PADR). These were passively collected electric indicators of treatment and control departments' performance and efficiency, e.g. departmental turnaround time on expense reports, staff sick time taken, and staff award nominations; see SM section K for a complete list. All administrative metrics except for the sick time taken were only available for the department-level unit of analysis, and were not traced to individual participants. However, due to serious issues of missing data from PADR, I did not use any administrative behavioral metrics in the main analyses.

3.2.4 Work-related attitudinal measures

The following measures were collected in the self-report survey two weeks after the end of the intervention (see SM section L2 for the full survey).

Attitudes: Individual empowerment. Ten questions elicited different aspects of staff's individual feelings of empowerment at work. We created separate pre-registered indices of specific topics, including job satisfaction (e.g., "all in all I am satisfied with my job," and "being frustrated comes with this job," reverse-coded), perceived sense of control at work (e.g., "there is

really no way I can solve all the problems I have at work,” reverse-coded), perceived voice at work (e.g. “I feel comfortable speaking up in meetings with colleagues and supervisors”).

Attitudes: Group empowerment. Six questions investigated aspects of workers’ sense of empowerment as a group. We created pre-registered indices of specific topics, including attitudes toward their work groups (e.g., “I feel part of a team that works well together in my department,” “I have confidence and trust in my coworkers”), friendships in the department (e.g., “I feel lonely in this factory”), and perceived care and respect at the university (e.g., “The University authority cares about and respects me”).

Manipulation check. We pre-registered two survey questions as experimental manipulation checks. The first asked to what extent staff were learning from each other as the participatory meetings manipulation would increase staff’s weekly discussion (“How often do you learn from your colleagues about how to do your job well?”). The second asked to what extent staff had knowledge about each other’s goals as staff voiced out their goals at the end of the participatory meetings treatment (“I know about the goals and objectives of my colleagues”).

Qualitative feedbacks. For treatment groups who experienced participatory meetings, we included questions about their subjective experience of the participatory meetings (e.g., “How do you like the weekly participatory meetings?” “How novel was this meeting style for the team?”). We also included three open-ended questions to elicit treatment groups’ feedback (e.g., “What do you find most helpful from these meetings?”).

3.2.5 Departmental climate

In the beginning of the intervention, two RAs and I paid 15-minute visits to each participating department and collected observational measures on the departments’ general “climate,” which we defined as the baseline positivity of the staff groups’ work environment,

including geographic centrality of the staff offices, how close staff sit with each other, and general impressions of the interaction patterns with the supervisors during these visits.

Specifically, we observed 11 items such as “How closely do staff sit together?” “Is it easy to find a chair to sit in the manager’s office?”, “How’s the conversation going, were they forthcoming?” (See SM section L1 for the complete list of observational measures). A high climate score suggests that the staff group were likely close to each other while a low climate score suggests there might be serious barriers to efficient communication in the baseline.

3.3 Results

3.3.1 Analysis strategy

We tested the average treatment effects of participatory meetings on staff’s survey outcomes two weeks after the intervention had ended. Linear regressions used fixed effects for each randomization pair in which the 32 groups were nested, a dummy variable indicating treatment, and a vector of pre-treatment individual demographic covariates to improve efficiency. Robust standard errors clustered by group accounted for residual covariance on the group level. Thus, to estimate the average treatment effect for an individual staff i of department (group) j ,

$$Y_{ij} = \beta_0 + \beta_1 D_{ij} + \gamma_1 \mathbf{Z}_{ij} + g_j + \mu_{ij}. \quad (1)$$

The regression coefficient β_1 represents the average treatment effect of the participatory meetings on staff attitudes, as measured by Y_{ij} in self-report surveys two weeks after the end of the experiment. D_{ij} refers to a binary variable of experimental manipulation randomly assigned to the participants, in which $D_{ij} = 1$ refers to participatory meetings condition and $D_{ij} = 0$ refers to the control condition. $\mathbf{Z}_{ij}$ is a vector of individual-level staff characteristics that are unaffected by the treatment (i.e., gender, age, race and ethnicity, education, and work experience). g_j denotes a

matched pair fixed-effect, and μ is a zero-mean error term, assumed to be mutually independent across (but not within) groups.

We analyzed the passively collected electric performance indicators using pre-registered time-series models (see SM section K2 for model specifications). However, an overwhelming proportion of the electric performance data from PADR were missing. Thus we dropped the analysis and focused on other measures of performance.

3.3.2 Balance test and manipulation check

We used a logistic regression with departmental pre-treatment characteristics (baseline productivity, academic division, staff headcount, faculty headcount, initial level of enthusiasm) to predict treatment assignment. The balance test revealed no significant observed differences on average between staff groups in the participatory meetings and control condition.

Two manipulation checks in the survey administered two weeks after the end of the intervention each supported the hypothesis that the participatory meetings were carried out as planned. Two weeks after the end of participatory meetings, staff in the participatory meetings condition still reported more frequent discussion with group members about how to do their job well ($M_{PM} = 3.15$, $SD = 0.66$; $M_C = 2.99$, $SD = 1.00$; $\beta = 0.50$, $CI = [.19, .82]$, $SE = 0.16$, $p = .002$; using a scale from 1 = *never* to 6 = *all the time*). Also, staff assigned to participatory meetings were more likely to report knowing about the goals and objectives of their group members ($M_{PM} = 4.90$, $SD = 0.70$; $M_C = 4.47$, $SD = 1.11$; $\beta = 0.63$, $CI = [.24, 1.02]$, $SE = 0.20$, $p = .002$).

3.3.3 Staff performance

We measured staff performance using 1) independent administrators' blind ratings and 2) staff's self-report of their own group performance. First, seven central administrators who are familiar with and have frequent and multiple contact with all or the majority of departmental staff groups rated the overall performance of every single departmental staff groups on a Likert scale from 1 to 5 with higher numbers indicating better performance. A regression model with pair fixed effects shows that departmental staff groups that participated in the treatment participatory meetings condition ($M_{PM} = 4.03$, $SD = .38$) were rated as more productive than staff groups in the control condition ($M_C = 3.57$, $SD = .67$), $\beta = 0.55$, $CI = [.06, 1.05]$, $SE = .23$, $p = .030$. As a robustness check, a between-group t-test shows a significant difference on performance ratings between departmental staff groups that participated in the treatment participatory meetings condition and staff groups in the control condition, $t_{(31)} = 2.41$, $p = .016$. Notably, there was no significant difference on performance ratings between departmental staff groups that participated in the experiment (including both treatment and control groups; $M = 3.79$, $SD = .60$) and staff groups that did not participate in the experiment ($M = 3.70$, $SD = .51$), $\beta = -0.12$, $CI = [-2.01, 1.77]$, $SE = .72$, $p = .90$. Such results suggest that even though participation in the experiment was voluntary, we did not observe a selection bias in which better or worse performing departments were self-selected into the experiment.

Second, all staff members self-rated their groups' overall performance with five survey questions ($\alpha = 0.81$). Consistent with my hypothesis, results show that staff in the treatment participatory meetings condition reported significantly higher level of performance than staff in the control condition ($M_{PM} = 5.93$, $SD = 0.81$; $M_C = 5.46$, $SD = 0.72$; $\beta = 0.78$, $CI = [.42, 1.14]$, $SE = 0.18$, $p < .001$).

3.3.4 Attitudes: Individual and group empowerment

For the group of indices that we pre-registered as indicating individual empowerment, treatment staff reported significantly higher level of voice ($M_{PM} = 6.04$, $SD = 0.79$; $M_C = 5.87$, $SD = 0.60$; $\beta = 0.55$, $CI = [.14, .95]$, $SE = 0.20$, $p = .008$), compared with staff in the control condition. For the group of indices that we pre-registered as indicating group empowerment, treatment staff reported significantly more favorable attitudes toward their work group ($M_{PM} = 5.79$, $SD = 0.74$; $M_C = 5.39$, $SD = 0.63$; $\beta = 0.69$, $CI = [.23, 1.16]$, $SE = .23$, $p = .004$), compared with staff in the control condition.

There was no statistically significant difference in individual empowerment between staff in the participatory meetings and control condition, as measured by other indices such as job satisfaction ($M_{PM} = 5.28$, $SD = 0.64$; $M_C = 5.17$, $SD = 0.82$; $\beta = 0.18$, $p = .42$), sense of control ($M_{PM} = 4.87$, $SD = .60$; $M_C = 4.81$, $SD = .63$; $\beta = 0.15$, $p = .20$). There was no significant difference between treatment workers in felt loneliness ($M_{PM} = 2.29$, $SD = 1.11$; $M_C = 2.40$, $SD = 1.05$; $\beta = -0.23$, $p = .52$), or perceived care and respect from the University ($M_{PM} = 4.59$, $SD = 0.80$; $M_C = 4.91$, $SD = 0.72$; $\beta = -0.10$, $p = .66$).

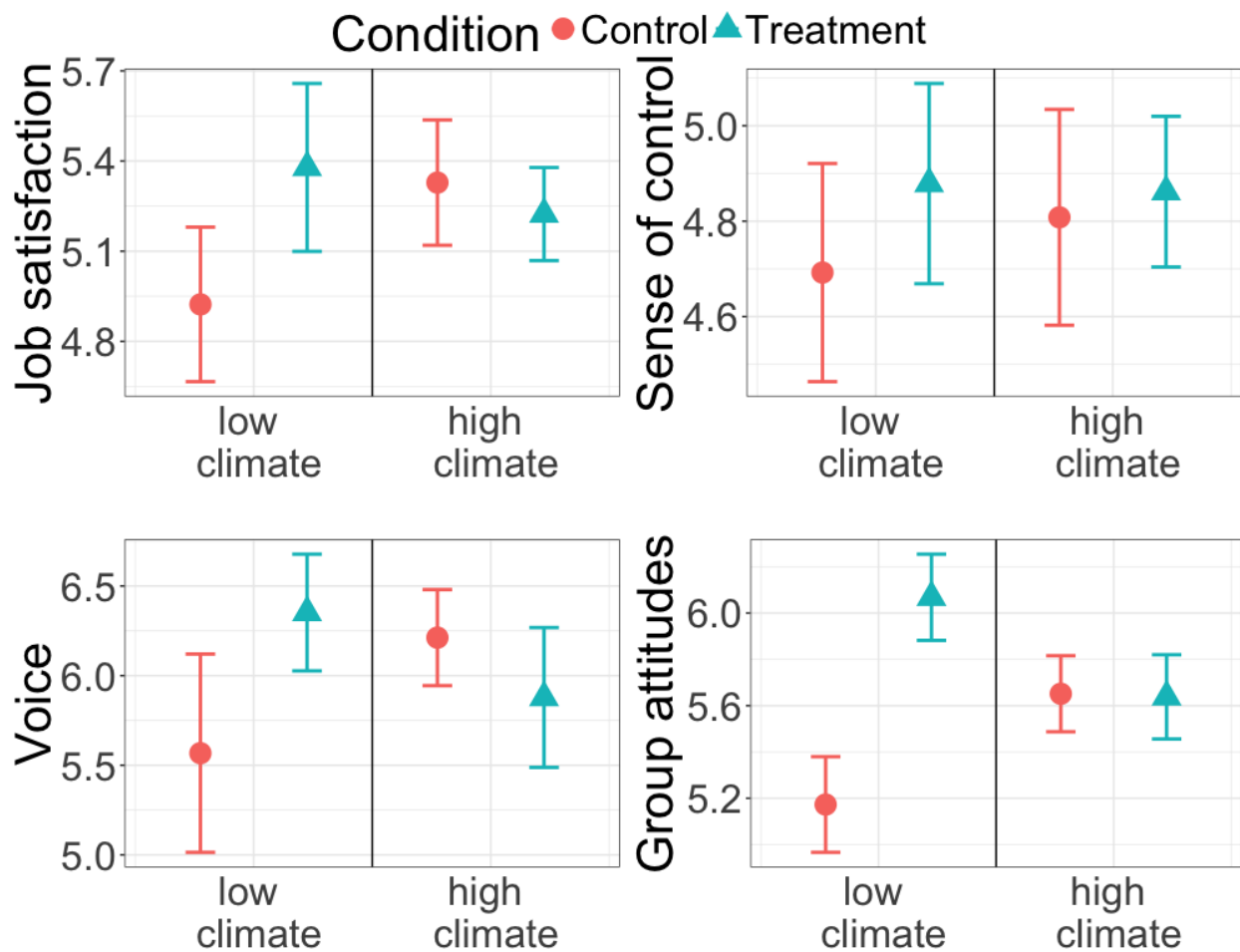
Since we conducted hypothesis testing on multiple outcomes from the survey data, we conducted a joint significance test against the null that none of the coefficients on treatment effects from multiple regressions were significant. As predicted, we rejected the null. Results from a joint significance test indicate that overall, there was a joint significant difference between staff groups in the treatment condition and staff groups in the control condition, $F = 2.86$, $p = .013$.

3.3.5 Exploratory heterogeneous effects

Between the administration of the pre- and post-treatment surveys, a member of our research team paid a 15-minute visit to each participating department to collect observational data on the departmental and also solicit qualitative feedback. We explored heterogeneity in response to the treatment, among different academic departments, by drawing on the observational departmental climate data. We did not expect that we would have enough power to reliably detect the heterogeneity at a conventional level of significance, but we wish to explore differences nonetheless. We used this climate index as an interaction term with the treatment term in our standard analysis model described above.

Results show that departments with lower climate scores responded more favorably to the participatory meetings treatment. Specifically, there was a significant interaction effect between departmental climate and condition on job satisfaction, $\beta = -1.48, p < .001$; on sense of control, $\beta = -0.68, p = .001$; on voice, $\beta = -1.00, p < .001$; on group attitudes, $\beta = -0.63, p = .049$; on perceived care from the university, $\beta = -1.19, p = .002$; on loneliness, $\beta = 2.05, p = .006$; and on self-reported group performance, $\beta = -0.37, p = .009$. See Figure 4 for interaction patterns between condition and departmental climate on outcome variables.

Figure 4. *Interaction Patterns Between Experimental Condition and Departmental Climate on Survey Outcomes.*



3.4 General discussion

In summary, a weekly 20-minute participatory meetings increased staff group performance, measured by both administrators' blind ratings and staff members' own ratings of their group performance. The effect size of such performance increase was large—the treatment groups were rated by roughly half a point higher on a 5-point Likert scale, or about one standard deviation higher than the performance of the control groups on average. Furthermore,

participatory meetings increased staff's perceived voice in their workplace and led them to express more favorable attitudes toward their group members. Such attitudinal changes were observed two weeks after the participatory meetings were no longer taking place.

The results generally replicated the Chinese factory experiment reported in Chapter 2. In this context where knowledge workers are used to daily participation in decision making in workplaces, in their families, and in political life, a small change in the participatory group structure at work was still able to change how they thought about their work and also how they worked. The fact that the results replicated despite the apparent contextual and sample differences between American university knowledge workers and Chinese factory workers suggests that it may not be the large overall difference in the level of participation that matters, but rather the consistent change in workplace participatory group structure that is driving the behavioral change, since it is the only overlapping factor in these two field experiments.

A limitation of the current experiment is the lack of more granular behavioral data on how knowledge workers perform (i.e. what constitutes productivity in this context). Future studies should gather more qualitative and quantitative data on how workers perform as to shed light on the aspects in which participatory meetings change human behavior. For example, for knowledge workers or other white-collar workers, workplace communication and task juggling could be a determinant of individual and group productivity. Even though the current experiment suggests that participatory meetings raised the perceived voice of staff and may have improved group communication, the process of change is still unclear. It was interesting and surprising that blind administrators were able to pick up the significant behavioral differences between treatment and control groups after the end of the intervention, but questions remain as to what

constitutes tangible changes in group performance, and in what ways were these changes attributable to ingredients of participatory meetings.

Future research should continue exploring the basic questions about group influence on behavioral and attitudinal change in broad social contexts, and continue addressing questions of generalizability of these changes.

4. Group Influence on Attitudes toward Authority and Justice

4.1 Introduction

In an attempt to understand the psychologies of fascist regime followers and of racism in the United States, psychologists following World War II started a distinguished line of work on attitudes toward authority and justice (Adorno, Brunswik, Levinson, & Sanford, 1950).

Authoritarianism, a tendency to be deferent to authority and to be intolerant of deviance from existing social hierarchies (Adorno et al., 1950; Altemeyer, 1981; Pettigrew, 2016), was conceptualized as a durable personality trait and as a syndrome that unifies interrelated attitudes toward authority, justice, and hierarchical relations (Adorno et al., 1950; see Eagly & Chaiken, 1993). Authoritarianism is believed to be in part heritable from parents, but also shaped by accumulated social experience and political context over time (Ludeke & Krueger, 2013; Pettigrew, 2016).

The present chapter investigates, by contrast, whether authoritarianism, or generalized attitudes toward authority and justice, can change over the short term. To test this, we modified the dynamics of weekly staff meetings at two very different workplaces, transforming the meetings into participatory events where staff are encouraged to talk and supervisors mandated to listen. These participatory meetings took place once per week for 20 minutes at a time, over the course of six weeks. We randomly assigned this participatory meeting schedule to some work groups and not others, and compared workers' attitudes toward generalized authority and justice two to four weeks after the intervention ended. Unlike previous research, this approach allows us to determine whether conditions relevant to authority and hierarchy within a local group could causally influence attitudes toward a much broader societal context.

Our research question is motivated by perspectives on the development of generalized attitudes toward authority and justice that have received less attention in psychology. First, the research is motivated by Pateman's (1970) theory of participatory democracy, which posits that workplaces inviting more worker participation can empower workers—decreasing workers' blind trust in authority and justice and motivating civic and political participation. Second, the research is motivated by Lewin's (1947) idea that meaningful social groups can serve as “cultural islands,” where attitudes can develop from immersive group experiences, even when these experiences stand in contradiction to the group's broader societal context (Lewin, 1947, p.37).

Below, we briefly review classic theories about the development and stability of authoritarian attitudes, including trust in authority and belief in justice. We then develop our hypothesis that short-term and immersive experiences, particularly within small groups, can influence generalized attitudes toward authority and justice in the larger society. Throughout, we treat attitudes toward authority and toward justice as separate but related attitudes (Kinder & Sears, 1985; McGuire, 1985).

Authoritarianism: A stable trait, shaped by long-term experience. Rooted in psychoanalytic theories, research on authoritarianism as a personality disposition (Adorno, et al., 1950; Altemeyer, 2006) claims that authoritarianism emerges early in life and is linked to an avoidant attachment style (Hopf, 1992). This research suggests that it is a durable trait, and inheritable across generations (Ludeke & Krueger, 2013), citing strong correlations between authoritarianism levels of young adults and their parents (Altemeyer, 1996).

Subsequent research also suggested structural correlates to authoritarian attitudes (Pettigrew, 1999; Duckitt, 1989). For example, increased perception of societal-level threats,

such as an economic downturn and elevated fear of crime, is positively associated with authoritarian attitudes (Sales, 1972; Pettigrew, 1999; Pettigrew, 2016). Stable authoritarianism is distinct from attitudes toward a concrete authority figure or institution. There is ample evidence showing that attitudes toward an authority in an interaction can be shifted with situational interventions (Tyler & Lind, 1992; Tyler & Weber, 1982), whereas research shows the stability of generalized authoritarian attitudes over the lifespan. In this way, theories from psychology concur with theories from political science (Dahl, 1956; Alford, Funk, Hibbing, 2005), that generalized attitudes toward authority and justice are shaped by a prolonged experience of learning and socialization. As part of a generalized ideology or “syndrome,” these attitudes develop from the breadth of a person’s experience (Kelman & Barclay, 1963; Stone, Lederer, & Christie, 1993; Pettigrew, 1999), including age, education, and social class.

Ideas about the roots of an individual’s authoritarianism can be traced back further to the work of Adam Smith and Karl Marx. Both scholars accentuated the role of long-term social experience, in particular the organization of daily work, which gradually shapes attitudes toward generalized authority and justice (Marx, 1867, p. 529; Smith, 1827, p.327). Using their work, later theorists argued that the lower socio-economic groups like factory workers were “trained to subservience” during the course of their lifetime occupation, since it is among this group that authoritarian personalities are most frequently found (Dahl, 1956).

None of these theories suggest that generalized attitudes toward authority and justice can be changed over the short-term. Rather, this body of work predicts that generalized authority and justice attitudes change in light of perceptions of a large societal threat, or from long-term experience with one’s family, social and economic status, and occupation. However, a separate area of theoretical work, also focused on the role of experience, suggests that generalized

authority and justice attitudes can be shaped by the structure of specific social contexts (i.e. the workplace) over a relatively shorter term.

Local work groups: A training ground for social attitudes. Influenced by Rousseau (1762/1968) and writings within political philosophy, the political scientist Carole Pateman (1970) theorized that participatory experience within one's daily occupation educates and socializes individuals to have more "political efficacy," which in part translates to less deferent attitudes toward authority and toward existing systems of justice. Like the economic and political theories reviewed above, Pateman acknowledges that workplaces are important training ground for the development of these generalized attitudes, since they force individuals to spend most of their time in relationships of superiority and subordination. Based on her theory that local social structure has significant impact on individual "psychological qualities" (Pateman, 1970, p.22), she predicts that workplaces that invite workers to participate in decision-making and management processes can affect workers' longstanding attitudes and even personality traits.

In psychology, classic theorizing by Kurt Lewin suggested that groups could create "cultural islands" by creating their own reality from their members' shared strong immersive experience within the group (Lewin, 1947; Lewin, Lippitt, & White, 1939). He explored this theory by studying a group of factory workers who were engaged over a number of weeks in more "democratic" working procedures—participatory and bottom-up, as opposed to autocratic and top-down. Lewin and colleagues (Lewin, 1947) tracked workers' positive behavioral response to this intervention, but never theorized whether individuals could leave these cultural islands and retain their shifted attitudes outside of the local workplace.

Theoretical predictions about the attitudinal and behavioral influence of a participatory workplace were empirically explored by some political scientists and economists, using

observational methods. Specifically, by surveying workers in companies that use more participatory workplace practices, those studies provided some support for the hypothesis that participation at work is correlated with more “democratic” workers who do not automatically defer to authority and current hierarchical arrangements (Elden, 1981; Budd, Lamare, & Timming, 2017). Studies of the hypothesis of participatory democracy are also focused on workplaces in the United States and Europe. Little research has been conducted in non-Western societies, especially those that are subject to non-democratic governments. To our knowledge, the central question of whether local participatory practices can cause changes in attitudes toward societal authority and justice has not been tested with experimental methods, or in a broad range of settings.

In the current study, we conducted field experiments to test whether work groups’ increased participation can shift generalized attitudes toward authority and justice. Using a classic paradigm of participatory group meetings in social psychology (Lewin, 1947), we hypothesized that individuals would become less deferent to authority and less likely to believe in a just world following an immersive group experience in which individuals are encouraged to speak up about and assume more authority over their work life. With two separate field experiments, we experimentally manipulated 20 minutes of work groups’ regular meeting time, once per week for six weeks. Weeks after the meetings ended, we measured workers’ generalized attitudes toward authority and justice, and a cluster of related attitudes such as perceptions of hierarchy and of relationships between lower and higher status groups as well as self-reported participation behavior in politics.

Our first experiment was set in China (also reported in Chapter 2), which is a particularly interesting site for testing the hypothesis that groups can become “cultural islands” when the

broader environment does not support the group practices (Lewin, 1947). In China and in the factory where we worked, authorities are less likely to endorse democratic and decentralized practices (Truex, 2017; Chang, 2008). Moreover, the participants in that experiment—young and less-educated female factory workers—are also on average less empowered to exercise or critique authority in their social and political contexts. Thus, Study 1 serves as a strong test of our hypotheses that participatory work contexts can change attitudes toward societal authority and justice, and that these shifts in attitudes can endure beyond the immediate group context. We conducted the second experiment in the United States with educated university administrative staff (also reported in Chapter 3), in order to replicate and to test the generality of Study 1's conclusions.

Below, we report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study. We pre-registered all survey items, item groupings, and analyses at the Open Science Framework (<https://osf.io/d9fnh/>).

4.2 Study 1

4.2.1 Method

The experimental procedure is described in Chapter 2. Four weeks after the experimental intervention had ended, the same team of RAs and the first author collected individual surveys from all 1,752 participants in the study's 65 work groups.

The survey (completion rate = 84.07%; 93.49% female) consisted of four parts: attitudes toward generalized authority, belief in a just world, perceived conflict between different social status groups, participation behavior outside of work (psychological involvement in politics and participation in family and social life). Both exploratory and confirmatory factor analyses supported these pre-registered item groupings. Questions about demographics (age, gender,

marital status, and rural or urban origin) and two manipulation checks were measured previously, one week after the end of the intervention. All items were translated and back-translated into Mandarin Chinese by two English-Chinese bilingual speakers, and have been piloted with an independent sample of factory workers.

General attitudes toward authority. We used three questions to elicit workers' general attitudes toward authority: "Obedience and respect for authority are the most important virtues children should learn"; "If people would communicate less and work more, everybody would be better off"; and "Every person should have complete faith in some supernatural power whose decisions he or she obeys without question" (answered on a 6-point scale from 1 = Strongly disagree to 6 = Strongly agree). These questions were adapted from measures of authoritarianism (i.e., the California F-scale, Adorno, Brunswik, Levinson, & Sanford, 1950; Right-wing Authoritarianism, Altemeyer, 1980), which were initially developed as personality assessment but have been widely used as attitude instruments to assess general attitudes toward authority and the tendency to accept authority (Ray, 1972; Rokeach, 1960; Rigby, 1982).

Belief in a just world. To measure workers' attitudes toward justice, broadly conceived, we used three questions adapted from past literature in belief in a just world and one question from the World Value Survey (Rubin & Peplau, 1975; World Value Survey 2010-2012 Wave, 2012): "Although evil men may hold political power for a while, in the general course of history good wins out"; "It is often impossible for a person to receive a fair trial in China"; "By and large, people deserve what they get" (answered on a 6-point scale from 1 = Strongly disagree to 6 = Strongly agree); and "Do you think most people would try to take advantage of you if they got a chance, or would they try to be fair?" (answered from 1 = People would take advantage of you to 6 = People would try to be fair).

Perceived intergroup conflict. We asked the workers to rate their perceived conflict between three social groups pairs with the prompt “In your mind, to what extent do the following social groups have conflict with each other?” (from 1 = *No conflict at all* to 5 = *Serious conflict*). The three pairs were “the rich and the normal people”, “the capitalists and the working class¹⁷” and “managers and workers in Chinese society.” We were particularly interested in the workers’ perceived conflict between managers and workers on the societal level, compared with their attitudes toward the local management (which were measured one week after the end of the experiment; Wu & Paluck, under review).

Participation outside of work. Five questions measured workers’ civil and political participation outside of their workplace. Two questions measured workers’ engagement in politics: “How much impact do you feel government policies have on your daily life?”; and “How often do you follow news about politics, e.g. in the daily newspaper, on television, or on the radio?”. Four questions measured participation in family and social life: “How is your relationship with your family?”; “How often have you participated in your family’s decision making lately?”; “How much influence do you intend to have on your kids or your future kids?”; and “How often do you socialize with your teammates off-work these days?”. Workers responded using a 6-point scale (from 1 = Not at all to 6 – Very much).

4.2.2 Results—Attitudinal changes toward authority and justice

We tested the average treatment effects of participatory meetings on workers’ attitudes a full month after the intervention had ended. Linear regressions used fixed effects for the 7 departments in which the 65 groups were nested, a dummy variable indicating treatment, and a

¹⁷ As Communist propaganda promised, ordinary people, identified as “workers,” were the masters of the new Chinese society. The majority of Chinese (50.2%) perceive themselves as working class, the counterpart of the western “middle-class” and is commonly perceived as a group in conflict with capitalists or bourgeoisie (Xiao & Qiu, 2017).

vector of pre-treatment individual demographic covariates to improve efficiency. Robust standard errors clustered by group accounted for residual covariance on the group level. Thus, to estimate the average treatment effect for an individual worker i of group j ,

$$Y_{ij} = \beta_0 + \beta_1 D_{ij} + \gamma_1 \mathbf{Z}_{ij} + g_j + \mu_{ij}. \quad (1)$$

The regression coefficient β_1 represents the average treatment effect of the participatory meetings on worker attitudes, as measured by Y_{ij} in self-report surveys four weeks after the end of the experiment. D_{ij} refers to a binary variable of experimental manipulation randomly assigned to the participants, in which $D_{ij} = 1$ refers to participatory meetings condition and $D_{ij} = 0$ refers to the observer condition. $\mathbf{Z}_{ij}$ is a vector of individual-level worker characteristics that are unaffected by the treatment (i.e., age, gender, marital status, and rural or urban origin). g_j denotes a departmental fixed-effect, and μ is a zero-mean error term, assumed to be mutually independent across (but not within) groups.

As a robustness check, we also treat group as a unit ($N = 65$) by calculating group means of each outcome variable measured in the survey, and conduct between-group t-tests to see if there was significant difference between participatory meetings condition and observer condition (results are consistent with what we report from linear regressions with fixed effects; see SM section I). Because we estimate several outcomes from the survey data, we used a joint significance test against the null that none of the coefficients on treatment effects from multiple regressions are significant.

General attitudes toward authority. The mean score of attitudes toward authority ($\alpha = .54$) for the whole sample was 4.05 ($SD = 0.37$). This value accords with the “slightly agree” point of the scale, which indicates that, on average, workers tended to slightly agree with

statements asserting complete obedience and respect for authority without question. However, workers in the participatory meetings condition reported significantly lower scores in attitudes toward authority ($M = 3.87$, $SD = 0.32$) than workers in the observer condition ($M = 4.23$, $SD = 0.33$, $\beta = -0.39$, $CI = [-0.55, -0.23]$, $SE = 0.08$, $p < .001$). Participatory meetings changed participants' attitudes toward general authority such that treatment workers registered as less authoritarian on a traditional scale of authoritarianism (see Figure 5).

These results were consistent when we analyzed each item within the index. One month after the end of the experiment, treatment workers who took part in these brief participatory meetings were significantly less likely to endorse obedience and respect for authority as the most important virtues children should learn ($M_{PM} = 4.47$, $SD = 0.41$, $M_C = 4.77$, $SD = 0.45$; $\beta = -0.38$, $CI = [-0.58, -0.18]$, $SE = .10$, $p < .001$), less likely to agree everybody would be better off if people would talk less and work more ($M_{PM} = 4.40$, $SD = 0.40$, $M_C = 4.88$, $SD = 0.36$; $CI = [-0.70, -0.35]$, $SE = .09$, $\beta = -0.52$, $p < .001$), and less likely to have complete faith in supernatural power ($M_{PM} = 2.71$, $SD = 0.44$, $M_C = 2.98$, $SD = 0.47$; $CI = [-0.48, -0.05]$, $SE = .11$, $\beta = -0.27$, $p = .014$).

Belief in a just world. For attitudes and perceptions in generalized justice ($\alpha = .32$), the mean score for the whole sample was 3.98 ($SD = 0.23$). This value is slightly below the “slightly agree” point of the scale, which indicates that, on average, workers tended to slightly agree with statements asserting belief in a just world. Workers in the participatory meetings condition reported significantly lower score in belief in a just world ($M = 3.86$, $SD = 0.22$) than workers in the observer condition who on average slightly agree with a just world belief ($M = 4.10$, $SD = 0.16$; $\beta = -0.26$, $CI = [-0.34, -0.18]$, $SE = 0.04$, $p < .001$). The results were also consistent for

each individual item in the scale. There was no difference among workers with different demographics.

Perceived intergroup conflict. Participants in the treatment and control group did not differ in their perceived conflict relations between the rich people and normal people ($M_{PM} = 3.56$, $SD = 0.22$; $M_O = 3.50$, $SD = 0.23$; $p = .24$, n.s.), or between the capitalists and the working class ($M_{PM} = 3.55$, $SD = 0.27$; $M_O = 3.29$, $SD = 0.17$; $p = .10$, n.s.). However, workers in the participatory meetings condition reported more conflict between managers and workers in Chinese society than workers in the observer condition ($M_{PM} = 3.55$, $SD = 0.27$; $M_O = 3.29$, $SD = 0.17$; $\beta = 0.31$, $CI = [0.21, 0.42]$, $SE = 0.05$, $p < .001$). Overall, treatment workers reported a higher level of intergroup conflict than control workers on average ($\alpha = .62$; $M_{PM} = 3.57$, $SD = 0.20$; $M_O = 3.43$, $SD = 0.16$; $\beta = 0.16$, $CI = [.07, .25]$, $SE = 0.05$, $p < .001$).

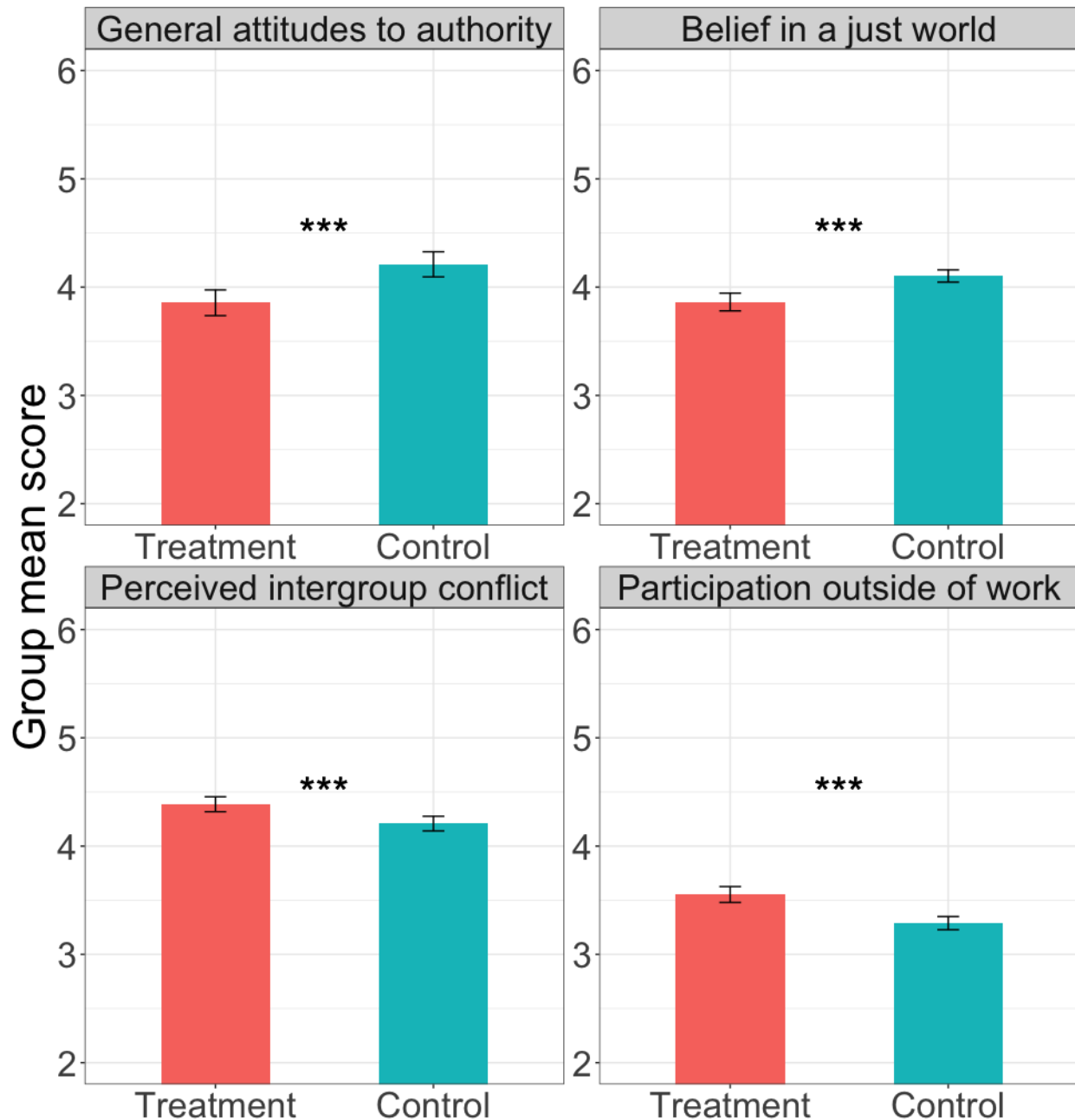
Participation outside of work. Workers in the participatory meetings condition reported higher levels of participation behavior outside of work ($\alpha = .37$; $M = 4.39$, $SD = 0.19$) than workers in the observer condition ($M = 4.21$, $SD = 0.19$), $\beta = 0.18$, $SE = 0.05$, $CI = [0.03, 0.21]$, $p < .001$. The same pattern was observed for the two spheres of off-work participation behavior—engagement with politics and with family and social life. Workers in the participatory meetings condition reported significantly higher interest in participation in politics ($M = 4.06$, $SD = 0.32$) than workers in the observer conditions ($M = 3.80$, $SD = 0.34$), $\beta = 0.29$, $CI = [0.13, 0.45]$, $SE = 0.08$, $p < .001$). Likewise, workers in the participatory meetings condition reported significantly more participation in family and social life ($M = 4.54$, $SD = 0.19$) than workers in the observer condition ($M = 4.41$, $SD = 0.21$), $\beta = 0.12$, $CI = [.03, .21]$, $SE = .05$, $p = .012$.

Joint Significance Test. Because we tested the average treatment effects on multiple dependent variables, we conducted a joint significance test on the null hypothesis that the

coefficients on average treatment effects from all the multiple regressions are jointly nonsignificant. As predicted, there was a jointly significant difference of the average treatment effects between workers in the participatory meetings condition and observer condition, $F(1, 58) = 8.06, p < .001$.

As a robustness check, the multivariate analysis of variance (MANOVA) was conducted to assess condition difference on all dependent variables recorded. The multivariate effect was significant by conditions, $F(1, 63) = 8.45, p < .001$, partial $\eta^2 = 0.44$. Thus, we conclude that participatory meetings significantly changed workers' attitudes compared with workers in the observer condition.

Figure 5. Study 1 group mean ratings of general attitudes toward authority, belief in a just world, perceived intergroup conflict between managers and workers in the larger society, and participation outside of work, on a 6-point scale. Ratings are shown as a function of assignment to participatory meetings condition (treatment). Error bars show 95% confidence intervals. Note: *** $p < .001$, ** $p < .01$, * $p < .05$.



4.3 Study 2

In Study 2, we replicated the Study 1 paradigm with administrative staff groups working at a prestigious private university in the United States (also reported in Chapter 3). Study 2 tests whether groups of knowledge workers in a Western democratic society also react to the relatively small adjustment to their experience of authority in the work place, similar to workers in more task-based settings in a strictly hierarchical, non-Western and non-democratic environment.

4.3.1 Method

The experimental procedure is described in Chapter 3. In Study 2, forty academic departments' administrative staff groups (out of 70 total) at a university in the United States agreed to participate in the study during the recruitment phase. Each group was comprised of an academic manager (the supervisor) and staff members who directly report to the manager (the workers). Supervisors agreed to participate in the study, and we moved forward with their participation if a majority of their staff also consented to participate. The median size of the administrative group was 6. The staff members' work is relatively independent, including job roles such as graduate and undergraduate administrators, finance managers, and event coordinators.

As in Study 1, we randomly assigned the 40 administrative groups to participate in a weekly morning participatory meeting (*participatory meetings* or *treatment condition*) or continue with their status-quo meetings (*control condition*). Supervisors and workers provided written informed consent before the experiment's commencement. To randomize, we used the same non-bipartite matching scheme in Study 1. Staff groups were matched based on their academic division (Natural Sciences, Social Sciences, Humanities, or Engineering), program

category (full-degree programs or interdisciplinary centers), staff headcounts, faculty headcounts, and initial level of enthusiasm shown by their RSVP and attendance at our recruitment events. When departments were paired, we randomly assigned one department in each pair to the participatory meetings condition, and the other to the control condition. Eight staff groups ($N_{treatment} = 5$, $N_{control} = 3$) dropped out of the study after randomization but before any data collection.¹⁸ The final sample consists 32 administrative groups or 172 individual staff members (78% female, 22% male; 80% identified as White or European-American; mean age = 50 years, ranged from 25 to 88).

Two weeks after the experiment ended, RAs collected individual surveys from treatment and control workers. Participants from each work group completed a paper survey sitting together in the conference room of their department. We used the same items from Study 1 to measure general attitudes toward authority and belief in a just world, except that Study 2 used a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree) while Study 1 used a 6-point scale¹⁹. We did not measure perceived intergroup conflict or participation behavior outside of work in Study 2. Like Study 1, we measured the groups' productivity and work-related attitudinal outcomes, which are reported in Chapter 3. We use the same analysis model as in Study 1. Post-hoc power analysis indicates that the achieved power given our sample size and average effect size was 0.82.

¹⁸ Reasons for attrition were departmental staff changes or not having enough time in the current academic semester.

¹⁹ We used a 6-point scale and excluded the neutral option for our Chinese sample because from previous studies, we found that Chinese participants were particularly inclined to select "neither disagree or agree," possibly due to the predominant cultural value of the *Middle-Way* (Wu, Bai, & Fiske, 2018).

4.3.2 Results

General attitudes toward authority. The mean score of attitudes toward authority for the whole sample was 2.77 ($SD = 0.68$) on a 7-point Likert scale. On average, workers tended to “slightly” with statements asserting complete obedience and respect for authority without question. Replicating Study 1, workers in groups who experienced participatory meetings reported significantly lower deference toward authority ($M = 2.70$, $SD = 0.88$) than workers in the control condition ($M = 2.90$, $SD = 0.46$; $\beta = -0.44$, $CI = [-0.85, -0.03]$, $SE = 0.21$, $p = 0.037$; see Figure 6).

Belief in a just world. The mean score of belief in a just world for the whole sample was 4.05 ($SD = 0.39$). This value is slightly above the “neither disagree nor agree” point of the scale, which indicates that, on average, staff members tended to be neutral with statements asserting generalized justice. As predicted, staff groups in the participatory meetings condition reported significantly lower score in belief in a just world ($M = 3.93$, $SD = 0.41$) than staff groups in the control condition ($M = 4.18$, $SD = 0.35$; $\beta = -0.23$, $CI = [-0.45, -0.005]$, $SE = 0.11$, $p = 0.045$).

Joint significance test. We conducted a joint significance test on the null hypothesis that the coefficients of average treatment effects on each attitudinal outcome are jointly nonsignificant. There was a joint significance of the average treatment effects between administrative staff groups in the participatory meetings condition and the control condition, $F(1, 26) = 3.35$, $p = 0.039$. We conclude that participatory meetings significantly changed administrative staff members’ attitudes toward authority and justice compared with those in the control condition.

Figure 7 shows the effect sizes for Study 1 and 2 together. Notably, they are quite similar in size, and understandably Study 2 features larger confidence intervals, due to its smaller sample

size. In both Study 1 and 2, participatory meetings changed participants' attitudes toward general authority and justice such that treatment workers registered as less authoritarian on a traditional scale of authoritarianism and on widely-used measures of belief in a just world and in traditional justice, four (Study 1) or two (Study 2) weeks after the participatory meetings ended.

Figure 6. Study 2 group mean ratings of general attitudes toward authority and belief in a just world on a 7-point scale. Ratings are shown as a function of assignment to participatory meetings condition (treatment). Error bars show 95% confidence intervals. Note: *** $p < .001$, ** $p < .01$, * $p < .05$.

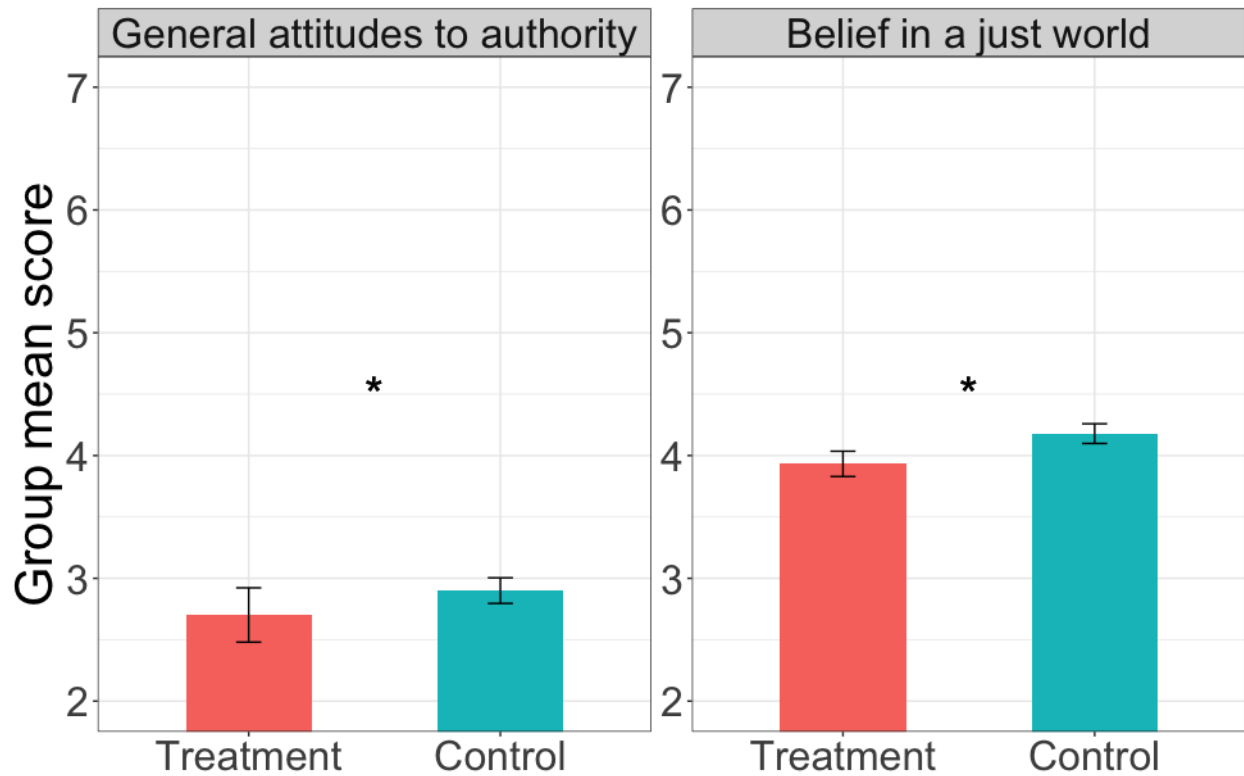
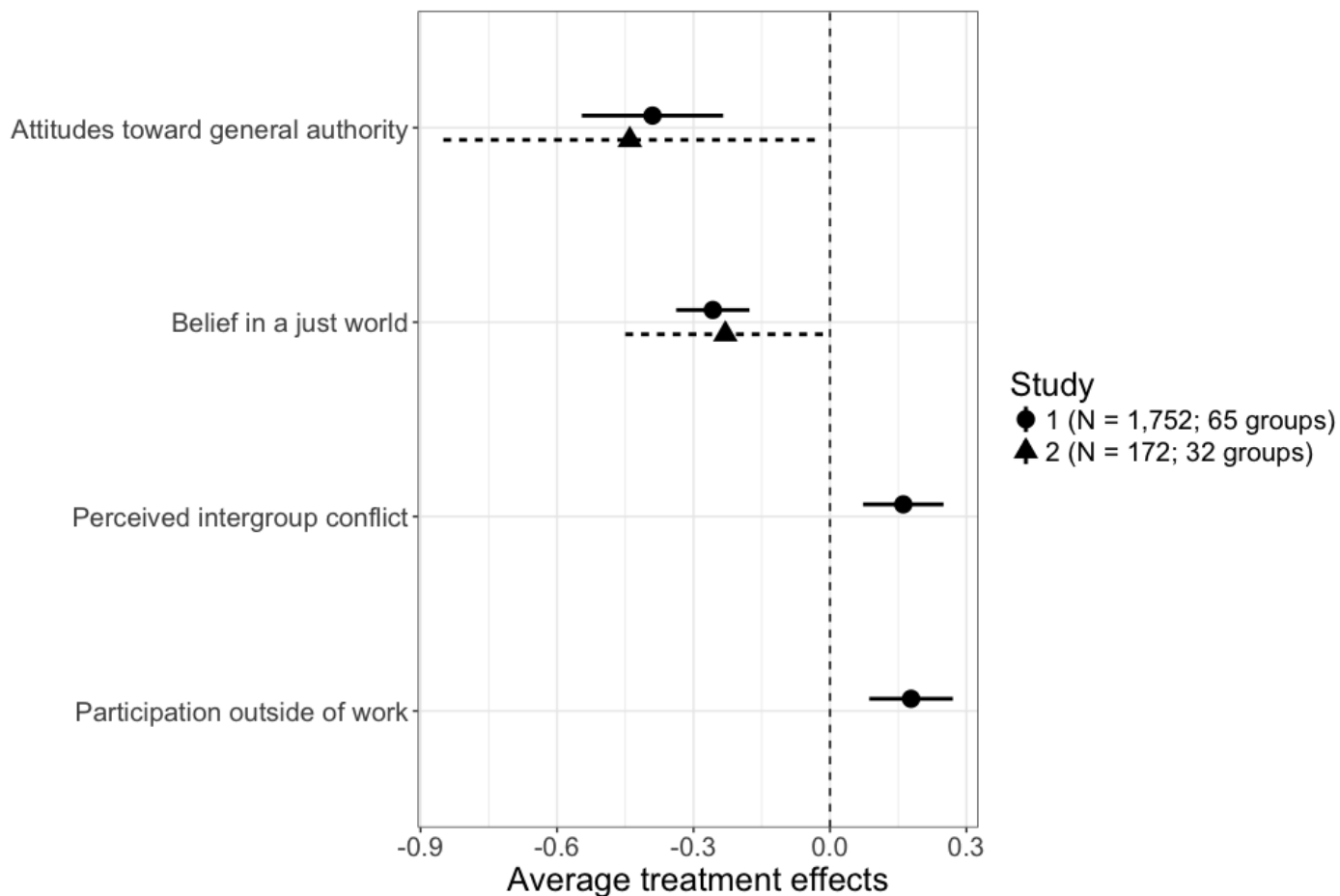


Figure 7. Average treatment effects from participatory meetings on social outcomes. The dots indicate the estimated coefficients from linear regressions with fixed effects, with robust standard error clustered on the level of groups. Error bars show 95% confidence intervals. Participatory meetings significantly reduced workers' authoritarian attitudes and belief in a just world, significantly increased perceived intergroup conflict between managers and workers in the Chinese society and workers' participation outside of work.



4.4 General discussion

Across two field experiments, the results provide support for our hypothesis that short-term participatory experiences at a work group could change attitudes that are traditionally conceptualized as stable and a product of one's personality and long-term social experience: attitudes toward societal authority and justice. Following a six-week period in which workers experienced a participatory meeting in which workers talked and supervisors listened, treatment

workers reported less deference to generalized authority and lower belief in the just nature of the world, compared to workers who were not assigned to these meetings. The size of these changes is roughly one standard deviation on the survey measurement scale, and is perhaps more impressive considering that they were observed one month (2 weeks, in Study 2) after participatory meetings had ended. Attitudes toward authority and justice changed without a shift in larger societal procedural justice and without a shift in the actual mechanisms of the workplace's authority and justice structures, beyond a 20-minute meeting each week. The data suggest that attitudes toward authority and justice can be affected by brief but immersive experiences with a more egalitarian local power structure.

In Study 1, workers assigned to the participatory meetings also reported a heightened level of perceived conflict between managers and workers in the larger Chinese society, but not greater conflict between other dominant and lower status groups, a focused finding that counters a potential alternative interpretation that treatment workers simply reported more negative attitudes. As reported in Chapter 2, these same workers assigned to participatory meetings also endorsed a more favorable attitude toward their own local factory management, reporting at significantly higher rates that factory management (i.e., the supervisors of their supervisors) cared about and respected them.²⁰ This effect was observed one week after the intervention and remained robust when re-tested one month later along with the variables reported in this study.

The contrast between treatment workers' increased positive attitude toward their local authority and their increased critique toward general societal authority suggests that attitudes toward local and societal authority were differentially influenced by the intervention. The literature of authority and procedural justice would predict the former (Tyler, 2006), but has little

²⁰ Workers in Study 2 did not become more positive about their local authority, likely because of a ceiling effect in positive attitudes toward the university.

to say about the latter. Specifically, authorities who listen to subordinates are perceived as fairer and more legitimate, but the literature on procedural justice does not address whether these interventions affect attitudes toward authority writ large, or authoritarianism. Perhaps, after experiencing a certain amount of voice and participation in the workplace meetings, workers felt more positively about their local workplace authority, a feeling that contrasted with other broad types of authority in their society. Another possibility is that treatment workers' positive experience expressing their voice in front of a local authority changed their expectations for their relationship to authority more generally, and encouraged them to adopt a more critical attitude toward authority and justice in society. Either or both of these related possibilities may be at work in this experiment, and warrant further exploration.

Furthermore in Study 1, treatment workers' self-reported participation in politics and family life also increased, and are of interest to a broader story of change²¹. Workers reported greater engagement with political news and greater participation in family decisions and peer interactions. These findings should be interpreted within the context of the experiment—many of these Chinese workers experience familial and social isolation as migrant workers, and as young women are relatively disempowered even in decisions about their own children that they left back home in rural areas with family (Chang, 2008). That greater critique of authority and lowered belief in the justness of the world would accompany a self-reported increase in assertion of the self suggests a global shift that might be cautiously labeled “empowerment.”

China is home to an authoritarian political system, and Study 1 results could be interpreted as an effect of high contrast—a democratic-style meeting held in an authoritarian society. However, we observe similar findings in Study 2, in which the workplace and societal

²¹ Due to survey time constraints in Study 2, we did not measure the same off-work participation behavior and perceived intergroup conflict as we did in Study 1.

contexts are drastically different from a hierarchical factory environment in a non-democratic state. The decreased belief in generalized authority and justice in American university staff groups is particularly intriguing, considering that they are situated in a liberal university in a Western democratic society, and are routinely engaged in active participation in their familial, social, and political life. Indeed, the average level of authoritarianism for all Study 2 administrative staff was low—few individuals reported unconditional deference to authority. Yet the participatory meetings decreased treatment staff's reported authoritarian attitudes further. Thus, it might not be the relative difference in worker participation that drives the attitudinal change toward authority and justice, but rather the implementation of regular opportunities to speak up in group, even in the short term. This regular opportunity to voice out one's opinion is the common factor between these two drastically different settings.

Participatory interventions have been popular in developing country settings, where aid organizations have attempted to found new, citizen-driven local institutions and encourage citizen involvement (see Mansuri & Rao, 2012). These interventions have not always been successful (Casey, Glennerster, & Miguel, 2012), but we do not think that they parallel the work we present here. The primary way in which the present intervention is different is that the participatory meetings are a modification to people's every day work environments, as opposed to an invention of a new institution with which no one yet identifies. Our participants already shared an identity with their fellow work group members, met with them every day, and worked within conditions that were relatively less participatory than the treatment period. The contrast between citizen-driven development programs and this participatory meeting highlights our theoretical interpretation that a regular, immersive modification of an individual's everyday world and social groups is the key to changing attitudes toward authority and justice.

We believe that our results provide some of the only causal evidence supporting the theory of participatory democracy (Pateman, 1970), which posits that the workplace provides a training ground for the development of democratic attitudes, including attitudes toward authority and ideas about the just or unjust nature of the world. (We imagine this may also be true for schools, which would be a further interesting direction for research.) Underlining the importance of these findings, many contemporary theories of democracy argue that democratic attitudes are necessary for stable democracy (Pateman, 1970; Mill, 1965; Cole, 1920). Attitudes toward authority and justice are likely one set of related attitudes that could cultivate participatory behavior in the civic and political realms. Future work will need to verify participants' self-reported claims about participation from Study 1 by measuring concrete behaviors, perhaps with standardized behavioral games or, with difficulty but high payoff, observed behaviors in the context of these workers' own lives.

Our findings also speak directly to Lewin's original intuition about the creation of democratic spaces within society, and more broadly his idea of a "cultural island," in which group-based cultures develop in compartments that are sometimes separate from that of the larger society (Lewin, 1947). In their work on changing leadership patterns from autocratic to democratic, Lewin and his colleague Alex Bavelas noted potential conflicting norms and value systems between the face-to-face groups they theorized about and the larger societal setting. In their view, the democratic dynamics of local face-to-face groups could be cultivated apart from a hierarchical society. Our findings support their theories about how certain procedures could cultivate more participatory group members; contrary to their expectations, we find that the local experience of participation spilled over into workers' attitudes toward the broader world. Our data suggest that these participatory groups were not, in a strict sense, cultural islands.

Compared with the wealth of previous research on the influence of individual differences on attitudes toward authority and justice, relatively little research has focused on the local situational factors that influence such attitudes. Our findings support the wisdom of earlier political theory on the spillover effect of local workplace participation. Perhaps surprising is that an entire workplace overhaul may not be the minimum change necessary to influence workers' outlook on society. Our research suggests that a temporary change in experience in individuals' work life can have a modest but weeks-long enduring impact, on social views considered so stable that they are often described as personality traits. Echoing Rousseau and Pateman, future research can explore whether local participatory experiences can not only change general attitudes, but also cultivate a more participatory democratic norm and active citizen engagement in the civil society.

5. Conclusion

My research in group dynamics has shown that changing a small facet of group life can lead to changes in a long-term behavioral pattern, and in generalized attitudes. The behavioral change in worker productivity was large, an 11% increase in workers' gross salary. The change was also long-lasting: the increase in worker productivity persisted for 9 weeks after the participatory meetings were no longer taking place. The behavioral change was accompanied by an increase in workplace empowerment: workers who experienced 20-minute participatory meetings reported higher aspects of individual and group empowerment such as job satisfaction and favorable attitudes toward their groups. Interestingly, the changes that happened within the work groups were not constrained to the workplace environment. I found that this brief immersive experience of exercising one's voice actually changed how individuals felt about societal authority and hierarchical structures, and also reduced their belief in the justness nature of the world.

Why did a brief adjustment in participatory group structure have such a strong and enduring effect on behavior and attitudes? I tested multiple avenues but found no evidence that the information workers gleaned from their discussions or the goals that they set were responsible for their change in behavior or attitudes. However, I found that voice, measured in multiple ways as the frequency with which workers spoke in front of coworkers and supervisors, was correlated with the observed behavioral change. The attenuation of these gains after 9 weeks after the participatory meetings ended was not predicted by within-factory responses to the intervention (such as changes in group composition by quitting, or reassignment of difficult tasks to treatment groups). This suggests that maintaining these productivity gains may require sustaining the minimal amount of participation in the workers' weekly meetings. Given the

intervention requires 20 minutes of time per week, this seems like a scalable solution for increasing productivity.

The behavioral and attitudinal changes through participatory group influence were generalizable beyond Chinese factory contexts. With 32 administrative teams in an American university setting, the results replicated. In this different context, where employees' voices are more routinely encouraged at work and in broader society, participatory group structure still increased treatment staff's performance and workplace empowerment, and also changed their attitudes toward broad societal hierarchies. These findings further support the power of participatory group dynamics in changing individual behavior and generalized attitudes across different contexts.

My dissertation contributes to several current debates with regard to group influence and behavioral change. In separate but related literatures spanning social, cognitive, industrial and organizational behavioral psychology, there has been enormous research interest in the general theme of how social groups motivate productivity. Across these different areas of psychology, this interest is manifested as research on teams, participation, hierarchy, and goals. Although the debates in each area address many of the same topics, these literatures do not speak to one another; moreover, most of these debates are not supported by studies that use experimental methods and that study actual (as opposed to fictional or one-time) groups. My dissertation represents to our knowledge the only well-powered, cluster-randomized field experiment testing causal relationships between participatory structures for work group and individual behavior and attitudes. In this respect, the current work is useful to the various theories discussed within these related literatures.

There are four ways that my empirical results move forward theory on groups and behavioral change across different literatures. First, the finding that participation in work groups significantly increased productivity as well as feelings of empowerment provides some of the first rigorous evidence for hypotheses about the effects of participation in social psychology. Second, the results show a clear average benefit of worker and not leader participation, which provides strong evidence for the hypothesis in organizational behavior that flattened hierarchy (versus clear hierarchy) is more beneficial to team productivity. Third, the motivational effect of setting individual goals in the group addressed social cognitive theories of motivation and goals in social and cognitive psychology. Finally, the current results suggest that voice serves as a mechanism driving behavior change, a finding that speaks to social psychologists who study social influence and behavioral change.

These findings also provide rare experimental support to early political theories of participation effects on orientations toward larger societal democracy (e.g. Pateman, 1970; Rousseau, 1762; cf. Budd, Lamare, & Timming, 2017). Speaking to this literature, our results suggest that groups in a workplace may indeed be a training ground for the development of political and social attitudes toward hierarchies and democratic institutions.

5.1 A general framework for research in group dynamics

Currently, there is a gap in small group research or intra group research. Most research on groups tend to focus on intergroup relations instead of intra group dynamics. The lack of research in group dynamics has a practical reason. When we study groups, the unit of analysis becomes a group, rather than an individual. For example, a triad is the smallest social aggregate that can be called a group; in order to study it, the effective sample size would triple that needed

to study individuals. Thus group research could become a daunting enterprise. However, efforts will pay off when we study groups in their natural environment.

By experimenting with natural groups in the field, we are able to theorize and test a behavioral equilibrium, or a long-lasting pattern of behavior. In order to do this type of research, we need to pay more attention to the contextual forces that are affecting individual psychology and behavior, and integrate qualitative field observations into quantitative findings when theorizing behavior change. We echo Lewinian theories that behaviors, even the most simple and routinized, occur in a tension system: the degree of constancy and motion (change) of individual or group conduct depends on the representations of social forces in the system. The totality of these driving and restraining forces determines the current behavioral equilibrium, and changing the equilibrium of the system requires a change in the force of the different tensions.

In the current projects, long-term individual productivity is a steady state, maintained by different levels of forces from the individual, the group, and the social environment that put pressure on the behavior in the world. There are forces that stimulate productivity, such as voice and information expressed in the group, and forces that restrain productivity, such as difficult task assignment from the factory management. Since all of these forces simultaneously contribute to the behavioral equilibrium of productivity, the study of groups in their natural environment enables us to capture how a change in group participation may affect the overall equilibrium and may affect the other restraining and driving forces.

An insight from the current research is that the group is not only a system resulting from various forces the circumstances provide, but the group can itself acquire value, functioning as a social force to facilitate individual behavioral change on top of others. For example, the group reinforces individual voice to act as a catalyst for behavioral change. Goals, when voiced in front

of groups, may not be merely personal goals, but augmented voices that further stimulate the catalytic power of groups for behavioral change. Of course, behavioral change is not unidirectional and the direction of change depends on specific group forces. Under participatory meetings, the group moves the equilibrium in line with driving forces for higher productivity. In other words, increasing individuals' participation in their group turns the group into a source of higher motivation.

The current research provides a template for future work in group influence and behavioral change. By studying groups in their natural environment, social psychologists may be able to uncover strategies for long-lasting behavior change.

5.2 Future directions

There are many questions to be answered with future research. Apparently, future research should continue replicating the participatory group paradigm in different contexts and with different populations to further test its generalizability. India would be an interesting case to replicate the factory experiment as it is another non-western country where labor intensive manual work constitutes a large part of its economy. Europe would be another interesting context to replicate the participatory group dynamics since it is home to participatory democracy (Rousseau, 1762) and participatory work groups (Pateman, 1970). By replicating in different contexts and examining the main effects of participatory group dynamics, we may be able to decipher the “rich thicket of reality” through which groups influence human behavior (James, 1907, p. 68; Gantman et al., 2018).

Future research should continue investigating the theoretical questions raised by our findings: the mechanism of enduring change, as well as the broader connections between these findings and other data on groups, teams, and societal change. For example, with respect to

mechanisms, our results suggest that participatory meetings drive behavior change through workers' experience of speaking up in their group, or "voice." Next I seek to address what constitutes voice in a group, and how it unfolds in dynamic interactions and leads to behavior change. We did not find that the information shared during the workers' discussion affected worker productivity, but perhaps sharing information matters in other workplaces, where worker tasks are less differentiated than those in a modern factory or university.

Another direction is to extend the field experimental research into different types of behavioral equilibria—patterns in which people and groups are stuck over time—involving non-work groups such as social groups and ethnic groups. For example, future research could examine the individual and group processes in groups discussing social issues such as discrimination and diversity. Currently, there is a lack of updated causal evidence and unified theory on the effect of these types of group dynamics on long-term behavior change.

In closing, this dissertation is my first step investigating the full ecology of forces—from the individual, the group, and the social environment—driving individual behavior and attitudes in the world over the long term, with the goal of deepening our understanding of a group-based science of behavior change, and of improving individual and collective well being and social justice.

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Supplementary Materials

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Section A – Participatory Meetings Training Protocol

Participatory meetings are comprised of three parts: discussion, group leader summary, and goal setting. Each part should be connected fluently and be treated as an organic entity.

Discussion leaders should start to gather people with the help of the group leaders starting 7:30am. Each meeting lasts around 20 minutes and should end before 8am. A discussion leader's duty is to facilitate the discussion, encourage workers to speak up and actively engage in solving production related issues jointly as a group. Discussion leaders should let workers talk for most of the time during the meeting, rather than the group leader or the discussion leader herself. While workers engage in active discussion and goal setting, discussion leaders will facilitate. For the best discussion facilitation, always use simple and everyday Mandarin that fits the workers' communication habits. Do not use any formal or written language expressions. In your first meetings, get a general impression of the group's dynamics such as the gender and age composition, whether people were talkative, and what people cared about the most. Use these insights to prepare for your next meetings' facilitation.

Discussion (around 15 minutes). A pre-arranged shuttle picks up and takes everyone to the factory before 7:30am. Each research assistant has to be on the production floor where her assigned group is located. As a discussion leader (or an observer in the control condition), we can never show up late. Greet your workers politely when you arrive on the production floor. As 7:30 approaches, start to gather workers in the group with its group leader. When every worker in the group arrives, ask them to gather in a circle and greet them warmly.

During the first meetings, discussion leaders initiate a round of self-introduction, such as names and how long the workers have been working in the factory. Discussion leaders set clear expectations during the first meeting, and briefly repeat the expectations at the start of each subsequent meeting. The protocol for discussion leaders goes:

“My name is *Zhang Xiaohong*, and you can call me Xiaohong. I’m a student from *Soochow University*, and I am helping a professor with a project on work experience. From this week on, I will come every *Monday* to lead a discussion with you on work related issues during your regular morning meeting time, for a period of six weeks. We will discuss the problems you have experienced in work, and the aim is for you to work better! Our meetings are easy-going. We encourage everyone to speak up! Just voice out whatever’s on your mind about your work, such as issues yesterday or in the past week, the difficulties you have at work, or things you think will help you and others. I may ask some questions, and there’s no right or wrong answers. Whatever you share will be helpful for the group and for us. I will take some notes during the discussion for research purposes, but I will not show my notes or talk with anyone who’s not in our project team, including the factory people.”

In subsequent meetings, discussion leaders repeat the expectation, “as we all know, it’s a meeting for us to share our opinions on production related issues. I’m here to discuss with you on how to work better, rather than testing you. No worry about being right or wrong. Just say whatever you think of about work and participate!”

As a warm-up for problem solving, discussion leaders can start with easy questions such as “what type of order are you all working on today?” and “what steps are each of you in charge of?”. Discussion leaders prepare and facilitate two questions for the workers to discuss. The number of discussion questions is secondary to the depth of the discussion. Though the content of discussion is flexible as long as it is work-related, we do have a module of focus for each week during the six-week intervention period. The module and suggested discussion questions are as follows:

Week 1: General feedback meeting, getting to know each other

Week 2: Production speed and quantity (e.g., how to work faster? What gestures and strategies are most efficient?)

Week 3: Quality control (e.g., how to avoid defects? If a defect occurs, how to most efficiently coordinate for repairing? How to self-examine that finished pieces are good before going through quality control?)

Week 4: Order switch (e.g. how to shorten the adaptation period when production orders change? How to deal with issues in this fast transition period?)

Week 5: Group coordination (e.g. how to increase group efficiency, such as the arrangement and transition of finished pieces? How to coordinate with the person before and after you?)

Work 6: Discussion topic tailored to specific groups (e.g. if a group's major concern is its production speed, then focus more on this topic, etc.)

Supervisor summary (0-3 minutes). As the pre-existing 20-minute morning meetings were led by the supervisors for managerial purposes, we left this time for them in case there are other important managerial issues group members need to know that cannot be conveyed during group discussion. The first author and the discussion leaders had reminded the supervisors to keep their post-discussion summary brief.

Goal setting (2-3 minutes). Towards the meeting's end, workers are encouraged to make individual goals on their daily production. Since orders are placed by customers and have tentative amounts and deadlines for production, the discussion leaders (research assistants) tell the workers about the orders placed by customers and specifically how many pieces each order requires and how long they have before the suggested deadline. For example, if an order placed asks for 10,000 pieces within 20 days, then a worker or a group is expected to produce around

500 pieces daily if they spread production evenly across days. The calculation is simple enough to do for workers with a Chinese elementary school education. Instead of being assigned a fixed production goal daily, workers will be given all the relevant information and encouraged to come up with a daily production goal themselves. Each worker is given a small piece of paper to do simple calculation and asked to voice out their goals in front of their group members.

In the end, discussion leaders wrap up the meeting and remind them about the following week's participatory meeting.

Section B – Qualitative Observations

About the factory.

The study took place in the Chinese branch of a multinational apparel manufacturer, which is the largest in employee size among all branches and is located in the eastern coastal area of China. Our study population, the factory workers, were mostly young women in their twenties or thirties²² who migrated from rural China to the city. The factory is built on the edge of the city and far from the city center, in a location that is relatively inconvenient to reach by public transportation. Around half of the workers live in adjacent factory dorms and another half commute to work on a daily basis. From field interviews prior to the experiment, we find that these workers are eager to work, but have little education (most of them have not finished high school) or training that would allow them to get a high-skilled job in the city. Hence, they enter manual work in apparel manufacturing, which is regarded as labor-intensive and low in skill requirement. Compared with its competitors, the factory pays very well and its workers, although extremely busy, mostly receive a salary in the rank of the lower-middle class²³ in the city.

Qualitative findings from the pilot intervention,

We recount the lessons learned from the pilot intervention (labeled *a* to *d*), followed by a series of field-note episodes within these experimental meetings, which briefly sketched parts of the meeting flow and group dynamics. Rather than a unified narrative, the following entries are a series of unfolding actions taken from different meetings across time. We understand that

²² The fact that the workers are mostly young village women with little education is very similar to the personnel composition in the Harwood factory in Lewin's time. Whereas Harwood had around 300 workers, the current factory has thousands of workers, with quite different manufacturing scale.

²³ The monthly wage of a typical worker in the experimental factory ranges from 3,000 Yuan (\$483.82) to more than 7,000 Yuan (\$1128.92). Some reference statistics: In 2013, the minimum wage per month in Beijing was 1,400 Yuan, about 24 percent of the 5,793 Yuan average monthly wage, as calculated by the municipal bureau of statistics. In Shanghai, the 2013 minimum wage was 1,620 Yuan, or 32.2 percent of the 5,036 Yuan average wage. Those are two of the highest income cities in China. The living standard of Suzhou is very close to Shanghai.

observer biases are hard to avoid in qualitative data collection (Emerson, Fretz, & Shaw, 1995), but tried to be as impartial as possible about our observations and writings.

(a) Workers were very quiet in the first treatment meetings, and gradually talked more and more as they got used to this participatory style of meetings.

In the first meeting with the quality control group, the workers automatically formed two strictly straight lines close to each other, one in front and one back, like soldiers in an army. The researcher told them to feel more relaxed and form a circle so that everyone could face each other. In response to this, nobody moved. The same thing happened in the first meeting with the embroidery group, where workers automatically lined up, with a sizeable distance (at least 6 feet) away from the researcher. The supervisor later told us that the workers were never required to stand in lines during meetings, but they had formed such a habit for some unknown reasons. We speculate that workers have internalized the authoritarian work style of the factory, including the hierarchical arrangements, and were ready to follow any rule of an authority without question.

Workers were reluctant to speak up in the first meetings, and refrained even from saying their names, as demonstrated in the following excerpts from field notes:

[1st meeting with the embroidery group, July 1]

I²⁴ started the meeting with self-introduction and went around the circle asking for their names. A silence. They were reluctant to talk. The girl standing in the middle of the workers facing me said “let’s start with supervisor Wang.” Wang said I had already met her. A short silence and I asked the person standing right next to me to start the self-

²⁴ Taken from field notes. “I” refers to the first author.

introductions. The girl looked down to the ground and quietly said her name. Then one after another. I repeated each of their names, making sure I got them right.

[1st meeting with the packing group, July 7]

“What are you working on today as a group?” I asked.

The workers looked at each other and nobody spoke. I encouraged them to speak up. A woman raised her hand and said they were packing clothes. The others murmured.

However, workers adapted to the participatory style at a faster rate than we had expected. For example, at the second meeting with the embroidery group, the workers started to smile and greet the researcher when she came in, and actively discussed the June salary payment²⁵. During the third and fourth meetings, most group members voluntarily expressed their opinions on production-related issues such as difficulty encountered with a new order, and how to develop good gestures with a machine.

(b) A participatory meetings intervention was the most effective when the tasks involved some level of collaboration between workers.

One question that remained unclear in Lewin’s work was whether a participatory meetings intervention was equally applicable to every work group. As a large part of the intervention treatment focuses on eliciting information exchange among workers on production related issues, we suspected the intervention would be most relevant for the groups which require collaborative tasks between group members, or for which an individual worker’s performance is affected by and will affect the performance of her coworkers. It was indeed what we found in our

²⁵ The salary payment day is on the 7th of each month.

pilot intervention. In groups that require collaboration between workers, like the sewing, packing, and cutting groups, workers expressed many constructive suggestions on what they need from the workers next to them to help themselves work faster and better, and what they could do to help their coworkers work faster and better. They had never thought of or had the chance to openly discuss working strategies like those. However, the discussion about group collaboration was not very successful for the embroidery and quality control groups, whose tasks did not necessitate collaboration between workers, as illustrated in the following episodes:

[1st meeting with the embroidery group, July 1]

“Are you working on short-sleeve or long-sleeve clothes? What kind of things are you all working on as a group today?” I asked.

“Each of us works on different things.” A worker said.

“What are each of you working on today?” I asked a second question.

“We all work on different things. Different things every day. We follow the supervisor’s assignments.”

“What are some of the strategies you’ve used for this task? Do you mind sharing with others? You know as a group, we need collaboration.”

A silence.

“Collaboration is not needed. We work on different things.” A woman quietly responded.

(c) The discussion flow was much more fluent for the groups whose workers' jobs were interdependent. Any work problem could be easily turned into a discussion after the first meeting.

The sewing division is the factory's largest and most labor-intensive. Workers are organized into 20-30 person groups which work on a specific order placed by companies all over the world. For example, a group may specifically work on a purple baby one-piece while another group works specifically on a blue dress during a certain time period. Each worker in a group is assigned a step in the apparel production processes and tends to repeat the same step until the whole order is completed. As a group is vertically integrated, an individual's work performance might affect the workers after her, even though their salary earnings only depend on individual piece rates. Nevertheless, the optimal strategy is for the group to achieve its maximum productivity so that everyone can have a stable high level of output, rather than for each individual to maximize her own profit (which results in a fluctuation of individual productivity because an individual cannot produce faster when prior steps are not finished). Coordination issues become more prominent when there is a production order switch. One problem came with new cloth patches, and inefficient coordination between workers and between different divisions. Workers complained about frequent order switches because they thought their salaries would suffer. Workers expressed grudges in the discussions. As one put it: "I can't work fast with new tasks. And I can't work fast unless the person before me works fast." Workers looked surprised when they heard that actually everyone shared the same problem. A solution might be as simple as help to unpack patches:

[2nd meeting with Friday's sewing group, July 10]

A girl standing in the middle, who is in charge of the first step of the work process, said:

“It would be great if the person after me or someone else will lend me a hand to carry the materials from carts to my working desk. The materials are too heavy for me and it slows me and also the group down.”

The woman after her nodded immediately and said she never noticed that the material-moving was slowing their performance. Another worker said she hoped others would help her to do a few pieces when she could not finish all of them in time.²⁶ For the sewing groups, any production-related issue could be developed into a discussion. Another example follows:

[2nd meeting with Thursday’s sewing group, July 9]

“We just changed new machines four days ago. It’s hard to adapt to them.”

“I’m a lot slower under the new machine and I don’t like it.”

“The technicians are not very responsive to our needs. I asked him several times to adjust my machine, but he’s slow.”

“I have that problem too!”

“Me too.”

These responses were prompted by the question, “what are some of your production problems that you’ve encountered this week?”. It turned out that the sewing departments just changed new machines the previous week. The new machines were supposed to be better and

²⁶ Every piece that is done by a certain individual will be counted as her own production, no matter if the pieces are assigned to her or to others. Thus helping is not “free.” However, from observation and interviews, workers seldom help others unless the group leader intervenes either because they did not know others need a help or they thought helping others waste their time.

safer than the old ones. But workers did not like them. Even though the factory had organized a lecture series from a technician on using the new machines, workers still had many problems unsolved. In the meeting workers discussed the problems they had encountered with the new machines. Hearing their voice, the supervisor focused on these problems in her supervisor summary part of the meeting, such as how to avoid leaking machine oil and how to communicate problems to the technicians.

(d) Putting questions in context and activating social roles elicited more responses than asking about individual experiences alone. Asking a question in an utmost concrete way was the most effective in getting responses from workers.

At the first several meetings, we encountered a problem that the workers found it difficult to describe “working strategies” in detail. Some workers thought on a very abstract level and said there were no specific strategies and everything came with some working experience. Several women mentioned that people would know the right gestures with experience but were unable to describe the process further. The researcher asked what a good gesture looked like and how to develop it. Again, the workers were unable to describe it in detail. However, when we put the question in the current context of the group and asked the question in another way, workers were able to understand the question in a concrete level and start the discussion:

[4rd meeting with Saturday’s sewing group, July 25]

The group switched order from producing a summer dress to a winter baby outfit at the beginning of this week. In the discussion, everyone said something about why switching tasks was hard for them. “We cannot work fast with new tasks. It takes time.” Several workers said. I asked whether everyone slowed down during order switch and they all

said yes, but some workers took less time to get used to the new tasks because they have “good gesture.”

“What is a good gesture? Do you mind sharing with the rest of us?”

A silence. Some people appeared to be thinking.

“A gesture is something that comes naturally.” A worker said.

“Previously you said more experienced workers tend to develop good gestures. For those of you who have been here long enough, how would you teach the newer workers here?

What would you do if a new worker asks you about the good gestures?”

A woman then walked close to the machine and showed how she used a mold to help sew a squared patch onto the front of an outfit seamlessly.

Apparently, the second way of asking the same question on “good gestures” was more effective as it created a concrete scenario for the workers to act upon, in particular when the social role of a “more experienced worker” in relation to a “new worker” was activated. Similarly, when we discussed why product defects occurred and how to avoid them, the workers’ first reactions were: *“I should be more careful,” “It comes with working experience. With more working experience, workers know how to avoid the defects,”* as two workers said during the discussions. But when the researcher pointed to a specific defective piece and asked how it occurred and how to repair it, workers focused the discussions on working strategies to fix that specific piece as well as other more general issues on product defects.

Workers were not used to thinking analytically about problems unless provided a concrete example or scenario. It may reflect a cross-cultural difference in people’s thinking style (Nisbett, Peng, Choi, & Norenzayan, 2011). The factory workers are used to thinking holistically

rather than analytically. Thus in the actual intervention, we always asked a question in the most concrete way possible and activated the context and social relations surrounding the target question to help workers engage in extended discussions.

Section C – Randomization

Table S1. Balance check. The balance test showed there was no significant differences between participatory meetings and observer condition for any pre-treatment characteristics. Omnibus $p = 0.40$.

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

	<i>Condition Assignment</i>
Education	0.303 (0.219)
DeptA3	-0.647 (1.164)
DeptB3	-0.532 (1.218)
DeptC2	-0.501 (1.193)
DeptC3	-0.326 (1.180)
DeptD2	-0.048 (1.181)
DeptD3	-0.614 (1.243)
Work experience	-0.095 (0.052)
Baseline productivity (first 6-week period)	-0.0002 (0.0002)
Baseline productivity (second 6-week period)	0.0002 (0.0002)
Gender	0.363 (0.304)

Age	-0.024 (0.015)
Constant	0.852 (1.344)

Optimal non-bipartite matching codes.

```
library("nbpMatching") # Beck, Lu, & Greevy, 2015

# Generate example data
my_data <- data.frame(x1 = rnorm(100),
                      x2 = rnorm(100),
                      x3 = rnorm(100),
                      x4 = rnorm(100))

# Extract variables we want to match on
match_data <- my_data[, c("x1", "x3", "x4")]

# Make distance matrix (can use `gendistance` function as well)
dist_mat <- as.matrix(dist(match_data))

# Construct matches
matches <- nonbimatch(distancematrix(dist_mat))

# Each row in `extracted_matches` is a paired-match
extracted_matches <- cbind(matches$halves$Group1.Row,
                           matches$halves$Group2.Row)
```

Section D – Productivity Results Robustness Checks

Section D1 – Robustness checks with market value as a dependent variable.

*From section “**Relationship between productivity and attitudes**”.*

We did not find a significant relationship between objective levels of productivity and individual or group-based worker empowerment. We then calculated the percentage change in market value produced from each worker’s baseline productivity to their productivity observed at the end of the intervention (six weeks after the start of the participatory meetings) to predict attitudes. On average, treatment workers experienced an 9.28% increase in productivity, compared to -0.62% of change in productivity among control workers ($\beta = 0.09$, $CI = [0.005, 0.170]$, $SE = 0.042$, $t = 2.09$, $p = .037$). Of all the attitudinal constructs, only job satisfaction was related to a change in productivity. We found a trending evidence on the interaction effect between condition and change in productivity: among treatment workers, the greater the change in productivity, the more job satisfaction they reported ($\beta = 0.17$, $CI = [-.07, .40]$, $SE = 0.16$, $t = 1.41$, $p = .15$). The pattern did not hold for control workers. Further, among treatment workers, job satisfaction at the end of the intervention predicted future increases in productivity six weeks later. The more job satisfaction treatment workers expressed in survey wave 1, the more their productivity increased six weeks after the survey ($\beta = 0.047$, $CI = [.001, .093]$, $SE = 0.023$, $t = 2.00$, $p = .046$).

*From section “**Process of change**”.*

No difference in informational gain. We next analyze the variability among treatment groups’ discussion of information and strategic coordination in their meetings, to see whether higher discussion of this information leads to greater productivity among these groups. Specifically, we use the estimated proportion of the discussion spent on problem solving and the number of workers who actively participated in problem solving. Used separately as two

measures, and combined multiplicatively, we find the same results. We did not find significant evidence that problem solving was linked to higher group productivity using a weekly lag of ratings and productivity (market value produced) over the course of the intervention ($\beta = 13.13$, $SE = 10.33$, $p = .21$). We also did not find evidence that problem solving averaged over the treatment period predicted increased productivity in the six weeks following the intervention—in fact, we found that problem solving marginally predicted decreased productivity in terms of gross salary ($\beta = -421.74$, $CI = [-913.30, 69.83]$, $SE = 237.03$, $p = .09$).

We also analyzed whether group-level variance in productivity decreased over time, which we might expect if workers were learning from one another and strategically coordinating around their goals. We found no difference in group-level variance in productivity (market value) comparing treatment and control groups (means of SD: $M_{PM} = 1143.09$, $SD = 409.99$; $M_o = 1118.02$, $SD = 291.99$; n.s.). However, individual-levels of productivity across time became more stable for treatment workers (mean of SD: $M_{PM} = 28.88$, $SD = 9.65$) compared with control workers ($M_o = 39.56$, $SD = 12.01$), $\beta = -10.38$, $CI = [-13.79, -6.97]$, $SE = 1.74$, $t = -5.97$, $p < .001$). Thus participatory meetings did not make groups less variable, but did make individual production more stable.

Voice in the participatory meetings correlates with productivity. We found that voicing one's opinions was significantly correlated with subsequent productivity (market value), on the group level. Both voicing opinions about production issues and about non-production-related issues marginally predicted higher group-level productivity during the treatment ($\beta_{production} = 32.21$, $CI = [-2.57, 67.00]$, $SE = 17.62$, $t = 1.83$, $p = .07$; $\beta_{non-production} = 21.70$, $CI = [-0.51, 43.90]$, $SE = 11.25$, $t = 1.93$, $p = .06$). Voicing opinions about production and non-production related issues also both predicted higher group-level productivity in the six weeks following the

treatment ($\beta_{\text{production}} = 520.75$, $CI = [112.31, 929.19]$, $SE = 196.95$, $t = 2.64$, $p = .01$; $\beta_{\text{non-production}} = 294.03$, $CI = [-30.37, 618.44]$, $SE = 156.42$, $t = 1.88$, $p = .07$).

In the positive direction, we found that group leaders' encouragement and praise of workers' participation in the meetings significantly predicted subsequent group productivity during the intervention ($\beta = 48.13$, $SE = 24.49$, $t = 1.97$, $p = .05$). In the negative direction, group leaders' interruption in the discussion (discouragement of voice) negatively predicted group performance during the intervention ($\beta = -46.36$, $SE = 21.15$, $t = -2.19$, $p = .03$). The positive pattern extended to productivity findings six weeks following the intervention; group leaders' frequency of encouragement significantly predicted greater group productivity ($\beta = 1244.97$, $SE = 391.26$, $t = 3.18$, $p = .004$). There were no significant predictive effects of other group leader behaviors following the intervention. We did not find a relationship between the frequency of leader scolding workers during treatment meetings and group productivity.

Section D2 – Robustness checks with outcomes at the average group level, using group averages as a dependent variable.

In addition to individual treatment effects (error clustered at the group level), we estimate group-level outcomes as robustness checks, which takes the group averages of each outcome variables as one data point (i.e., there are 65 data points for each regression). The group-level robustness checks will take the form of

$$P_t = \beta_0 + D_t\beta_1 + \mathbf{H}_t\boldsymbol{\gamma}_1 + g_t + \mu_t. \quad (2)$$

where for group t , β_1 represents the average causal effect of the treatment on group average productivity, as measured by group average productivity P_t during and after the 6-week period of the experiment. D_t refers a binary variable of experimental manipulation randomly assigned to groups (1 = treatment participatory meetings, 0 = control observer meetings), and $\mathbf{H}_t$ denotes a vector of baseline controls for pre-treatment group productivity, broken up into 6-week averages. g_t denotes a departmental fixed-effect. μ is a zero-mean error term, assumed to be mutually independent across groups.

Average worker productivity.

In the six-week period of the experiment, workers who participated in weekly participatory meetings were significantly more productive than workers who had a weekly outside observer at their meeting. The difference is large in monetary terms, and is robust to different measures of productivity (refer to Table S2). Treatment workers earned 561.29 Yuan (\$81.50) more than the control workers over the course of six weeks (CI = [42.95, 1079.62], $t = 2.17$, $p = 0.03$, SE = 258.31). This equals 8.49% of workers' average gross salary during this time period. In addition, treatment workers produced 323.71 Yuan (\$47.0) more goods in market

value (measured by raw amount produced) than control workers (CI = [-37.49, 684.91], SE = 180.00, $t = 1.80$, $p = .078$). This difference, which is of primary interest to the factory, equals 6.37% of workers' average raw amount produced. Thus, participatory meetings increased productivity from both the workers' and factory management's perspective. These results are robust to using departmental fixed effects and baseline covariates.

Long-term average worker productivity.

The productivity gains among workers in the participatory meetings condition relative to the observer condition sustained for at least 6 weeks after the experiment, during which all workers returned to their previous regular morning meeting schedule without group discussion. The sustained gains were observed for both gross salary and raw amount produced. Workers who participated in participatory meetings earned 617.14 Yuan (89.61 USD) more than workers in the observer condition (CI = [190.02, 1044.25], SE = 212.85, $t = 2.90$, $p = 0.005$), which equaled 10.41% of workers' average gross salary. Furthermore, treatment workers produced 407.05 Yuan (59.10 USD) more goods in market value than control workers (CI = [81.48, 732.62], SE = 162.24, $t = 2.51$, $p = 0.015$), which equaled 8.65% of workers' average raw amount produced. Again, results are robust to using departmental fixed effects and baseline covariates (see table S2).

Table S2. Productivity at the average group level.

	<i>Dependent variable:</i>							
	Experimental period				Long term			
	Gross salary (1)	Gross salary (2)	Market value (3)	Market value (4)	Gross salary (5)	Gross salary (6)	Market value (7)	Market value (8)
Participatory meetings	772.9* (296.5)	561.3* (258.3)	505.5* (210.6)	323.7+ (180.0)	704.6** (240.9)	617.1** (212.9)	487.9* (185.3)	407.0* (162.2)
Baseline productivity (first 6-week)		0.3* (0.2)		0.2 (0.2)		0.3 (0.1)		0.2 (0.1)
Baseline productivity (second 6-week)		0.1 (0.1)		0.2 (0.1)		0.3* (0.1)		0.3* (0.1)
Constant	5,947.0*** (447.0)	4,506.1*** (772.1)	4,525.4*** (317.4)	3,671.7*** (577.2)	7,113.7*** (363.1)	5,433.4*** (636.2)	5,352.1*** (279.4)	4,054.6*** (520.2)
Observations	65	65	65	65	65	65	65	65

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Section D3 – Robustness checks with outcomes at the total group level.

Total group productivity.

In the six-week period of the experiment, work groups that participated in weekly participatory meetings were significantly more productive than work groups that had a weekly outside observer at their meeting. The difference is large in monetary terms, and is robust to different measures of productivity (refer to Table S3). Treatment groups earned 18,612.42 Yuan (\$2,808) more than the control groups over the course of six weeks (CI = [3,841.58, 33,383.26], SE = 7,360.96, $t = 2.53$, $p = 0.01$). In addition, treatment groups produced 12,551.78 Yuan (\$1,894) more goods in market value (measured by raw amount produced) than control groups (CI = [1,904.19, 23,199.37], SE = 5,306.16, $t = 2.37$, $p = .02$). Thus, participatory meetings increased productivity from both the workers' and factory management's perspective. These results are robust to using departmental fixed effects and baseline covariates.

Long-term total group productivity.

The productivity gains among groups in the participatory meetings condition relative to observer condition sustained for at least 6 weeks after the experiment, during which all groups returned to their previous regular morning meeting schedule without group discussion. The sustained gains were observed for both gross salary and raw amount produced. Groups who participated in participatory meetings earned 18179.96 Yuan (\$2874.43) more than groups in the observer condition (CI = [4002.97, 32356.95], SE = 7074.19, $t = 2.57$, $p = 0.013$). This equals 11.11% of workers' average gross salary during this time period. Furthermore, treatment groups produced 12097.43 Yuan (\$1912.92) more goods in market value than control groups (CI = [1919.95, 22274.91], SE = 5078.47, $t = 2.38$, $p = 0.021$), which equaled 9.71% of work groups'

average raw amount produced. Again, results are robust to using departmental fixed effects and baseline covariates (see Table S3).

Table S3. Productivity at the total group level.

	<i>Dependent variable</i>							
	Experimental period				Long term			
	Gross salary		Market value		Gross salary		Market value	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Participatory meetings	30,582.6 (17,162.4)	18,180.0* (7,074.2)	21,198.9 (12,722.3)	12,097.4* (5,078.5)	26,855.0 (14,207.8)	15,786.7** (5,881.5)	19,550.0 (11,065.0)	10,949.7* (4,355.9)
Baseline productivity (first 6-week)		0.9*** (0.1)		0.9*** (0.1)		0.6*** (0.1)		0.6*** (0.1)
Baseline productivity (second 6-week)		-0.1 (0.2)		-0.02 (0.2)		0.2 (0.1)		0.2 (0.1)
Department fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Constant	120,516.7*** (25,869.7)	45,685.6*** (12,433.8)	91,827.5*** (19,176.9)	32,460.7*** (9,324.0)	153,655.1*** (21,416.1)	97,884.4*** (10,337.6)	115,382.7*** (16,678.9)	68,627.3*** (7,997.4)
Observations	65	65	65	65	65	65	65	65

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Section D4 – Robustness checks with 62 groups (intact pairs).

We applied a non-bipartite matching scheme within each department and randomly assigned groups from all seven departments ($N = 65$) to either the treatment or the control condition. For departments with an odd number of groups, we assigned the one group that did not achieve a match to the observer condition, as was desired by the factory. Here we report results excluding those three unmatched departments. The results were consistent.

Worker productivity.

In the six-week period of the experiment, workers who participated in weekly participatory meetings were significantly more productive than workers who had a weekly outside observer at their meeting. The difference is large in monetary terms, and is robust to different measures of productivity (refer to Table S4). Treatment workers earned 530.22 Yuan (\$80) more than the control workers over the course of six weeks (CI = [466.25, 994.18], SE = 236.52, $t = 2.24$, $p = 0.025$). This equals 9.38% of workers' average gross salary during this time period. In addition, treatment workers produced 328.92 Yuan (\$50.00) more goods in market value (measured by raw amount produced) than control workers (CI = [8.29, 649.55], SE = 163.45, $t = 2.01$, $p = .044$). This difference, which is of primary interest to the factory, equals 7.60% of workers' average raw amount produced. Thus, participatory meetings increased productivity from both the workers' and factory management's perspective. These results are robust to using departmental fixed effects and baseline covariates.

Long-term worker productivity.

The productivity gains among workers in the participatory meetings condition relative to observer condition sustained for at least 6 weeks after the experiment, during which all workers returned to their previous regular morning meeting schedule without group discussion. The

sustained gains were observed for both gross salary and raw amount produced. Workers who participated in participatory meetings earned 548.73 Yuan (\$83.00) more than workers in the observer condition (CI = [174.66, 923.80], SE = 191.19, $t = 2.87$, $p = 0.004$), which equaled 10.09% of workers' average gross salary. Furthermore, treatment workers produced 368.10 Yuan (\$56.00) more goods in market value than control workers (CI = [80.62, 655.57], SE = 146.54, $t = 2.51$, $p = 0.012$), which equaled 8.99% of workers' average raw amount produced. Again, results are robust to using departmental fixed effects and baseline covariates (see Table S4).

Table S4. *Robustness check – worker productivity with 62 groups.*

	<i>Dependent variable</i>							
	Experimental period				Long term			
	Gross salary		Market value		Gross salary		Market value	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Participatory meetings	540.46*	530.22*	340.64	328.92*	524.63*	548.73**	356.19*	368.10*
	(266.86)	(236.52)	(182.35)	(163.45)	(216.57)	(191.19)	(166.46)	(146.54)
Work experience		38.28		28.55		71.07**		56.37**
		(32.51)		(21.94)		(24.91)		(18.76)
Education		162.32		104.50		-105.06		-91.55
		(118.30)		(87.51)		(181.17)		(147.14)
Baseline productivity		0.45***		0.41***		0.32***		0.32***
(first 6-week)		(0.06)		(0.05)		(0.06)		(0.06)
Baseline productivity		0.05		0.06		0.14*		0.15**
(second 6-week)		(0.05)		(0.05)		(0.05)		(0.05)
Constant	6,333.20***	4,051.23***	4,812.30***	3,083.37***	7,639.20***	5,870.74***	5,742.59***	4,247.47***
	(468.87)	(416.00)	(346.98)	(304.98)	(283.91)	(394.36)	(209.45)	(309.00)

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Section E – Survey materials

Table S5. Survey items.

Category	Item	Repeated in survey wave 2
Job satisfaction	All in all I am satisfied with my job	Yes
	In general, I don't like my job*	Yes
	I often think about quitting*	
	I am looking for a new job*	
	Being frustrated comes with this job*	Yes
Sense of control	To what extent do you have control over what happens on your job?	Yes
	I sometimes feel I am being pushed around in my life*	Yes
	There is really no way I can solve all the problems I have at work*	Yes
Happiness and wellbeing	Did you experience happiness during a lot of the day yesterday?	
	All things considered, how satisfied are you with your life as a whole these days?	Yes
Sense of individuation	Most of the people on my group know my name.	
Group attitudes	How do you like your coworkers?	
	How often do you socialize with your coworkers during work?	
	I feel I am really part of my group.	Yes
	I have confidence and trust in my coworkers.	Yes
	I like my group.	
	I feel that in the factory, everyone's part of a big family.	Yes
	I get involved to benefit my work group.	
	I help others in my work group learn about the work.	
	I assist others in my group with their work for the benefit of the group.	
	The work we do here is important to the factory	
Felt care and respect	The factory ("the higher" as in Chinese) cares about and respects us.	Yes
Loneliness	Think about your good friend(s) in the factory, and list the number of people you can go to at the factory when you have problems because they will help you. (list #)	
	I feel lonely in this factory*	Yes

Note: Items are translated into Chinese and back-translated to English by two independent Chinese-English bilingual speakers. Most of the items were piloted with an independent group of workers. Asterisks signify items that are reverse coded.

Table S6. Descriptive statistics for survey constructs.

		Wave 1				Wave 2			
		Treatm ent	N	Control	N	Treatm ent	N	Control	N
	Job satisfaction	4.473 (0.340)	665	4.286 (0.345)	685	4.062 (0.294)	685	3.842 (0.309)	640
Individual empower- ment	Happiness and well-being	4.075 (0.329)	665	3.945 (0.493)	659	3.947 (0.254)	686	3.836 (0.188)	642
	Sense of control	3.966 (0.321)	664	3.681 (0.302)	658	3.775 (0.326)	682	3.528 (0.393)	636
Group empower- ment	Group attitudes	4.657 (0.222)	666	4.533 (0.313)	659	4.192 (0.266)	685	4.117 (0.531)	639
	Loneliness	2.989 (0.476)	661	3.296 (0.445)	652	3.081 (0.482)	682	3.238 (0.405)	639
	Perceived respect	3.601 (0.411)	659	3.087 (0.623)	654	3.420 (0.403)	683	3.088 (0.574)	634
Man. check	Frequency of communication	2.597 (0.253)	663	2.388 (0.261)	660	2.454 (0.201)	685	2.233 (0.322)	639

Section F – Survey Robustness Check

Section F1 - Survey robustness checks including new workers.

Survey results.

Attitudes: Individual and group empowerment. Workers assigned to the participatory meetings reported more individual and group empowerment. For the loose group of measures designated as individual empowerment, treatment workers reported significantly more positive attitudes, including more job satisfaction ($M_{PM} = 4.05$, $SD = 0.29$; $M_O = 3.84$, $SD = 0.25$; $\beta = 0.21$, $CI = [0.08, 0.33]$, $SE = 0.06$, $p = .001$), and more sense of control at work ($M_{PM} = 3.77$, $SD = 0.32$; $M_O = 3.56$, $SD = 0.35$; $\beta = 0.25$, $CI = [0.09, 0.41]$, $SE = 0.08$, $p = .002$), compared with workers in the observer condition. One exception was happiness and well-being, where there was no difference between treatment ($M_{PM} = 3.91$, $SD = 0.21$) and control workers ($M_O = 3.84$, $SD = 0.18$, $p = 0.06$).

Workers in participatory meetings expressed more favorable attitudes toward their work group, including affiliation with the group and trust and confidence in group members, than workers in the observer condition ($M_{PM} = 4.68$, $SD = 0.23$; $M_O = 4.55$, $SD = 0.30$; $\beta = 0.13$, $CI = [0.01, 0.26]$, $SE = 0.07$, $p = 0.042$). Treatment workers also felt less lonely ($M_{PM} = 2.98$, $SD = 0.45$; $M_O = 3.32$, $SD = 0.34$; $\beta = -0.33$, $CI = [-0.52, -0.14]$, $SE = 0.10$, $p < .001$) and reported that the factory cared about and respected them to a greater extent than workers in the observer condition ($M_{PM} = 3.65$, $SD = 0.41$; $M_O = 3.11$, $SD = 0.61$; $\beta = 0.53$, $CI = [0.29, 0.78]$, $SE = 0.13$, $p < .001$).

Longitudinal attitude change. In the second wave of the survey four weeks after the end of participatory meetings, we repeated the manipulation check question. Even though they no longer participated in participatory meetings, workers in the participatory meetings condition

reported more frequent discussion with group members about how to do their job well than did the control workers ($M_{PM} = 2.44$, $SD = 0.20$; $M_O = 2.22$, $SD = 0.27$; $\beta = 0.22$, $CI = [0.12, 0.32]$, $SE = 0.05$, $p < .001$).

Just as they did in Wave 1, workers assigned to participatory meetings reported higher job satisfaction ($M_{PM} = 4.05$, $SD = 0.29$; $M_O = 3.84$, $SD = 0.25$; $\beta = 0.21$, $CI = [0.08, 0.34]$, $SE = 0.06$, $p = .001$), and more sense of control at work ($M_{PM} = 3.77$, $SD = 0.32$; $M_O = 3.56$, $SD = 0.35$; $\beta = 0.25$, $CI = [0.09, 0.41]$, $SE = 0.08$, $p = .002$) compared to control workers. Again, there was no difference in reported happiness and well-being between treatment ($M_{PM} = 3.91$, $SD = 0.21$) and control workers ($M_O = 3.84$, $SD = 0.18$; $p = 0.11$).

Treatment workers continued to feel that the factory cared about and respected them ($M_{PM} = 3.47$, $SD = 0.39$) to a greater extent than the control workers did ($M_O = 3.13$, $SD = 0.55$; $\beta = 0.38$, $CI = [0.17, 0.58]$, $SE = 0.11$, $p < .001$). Though treatment workers expressed more favorable attitudes toward group life and felt less lonely in Wave 1, by Wave 2 there was no difference in attitudes toward their work groups ($M_{PM} = 4.19$, $SD = 0.28$; $M_O = 4.10$, $SD = 0.32$; $\beta = 0.07$, $CI = [-0.07, 0.21]$, $SE = 0.07$, $p = 0.31$) or feelings of loneliness ($M_{PM} = 3.10$, $SD = 0.46$; $M_O = 3.24$, $SD = 0.39$; $\beta = -0.16$, $CI = [-0.33, 0.02]$, $SE = 0.09$, $p = .075$).

Section F2 – Survey robustness checks for missing value imputation.

As a robustness check, if a worker skipped a certain question, we replace the missing response with the mean sample score of the corresponding survey item, and report the survey results with missing value imputation. The results were consistent with those from the main text.

Survey results.

Attitudes: Individual and group empowerment. Workers assigned to the participatory meetings reported more individual and group empowerment. For the loose group of measures designated as individual empowerment, treatment workers reported significantly more positive attitudes, including more job satisfaction ($M_{PM} = 4.46$, $SD = 0.29$; $M_O = 4.29$, $SD = 0.28$; $\beta = 0.16$, $CI = [0.03, 0.29]$, $SE = 0.06$, $p = .013$), and more sense of control at work ($M_{PM} = 3.94$, $SD = 0.26$; $M_O = 3.70$, $SD = 0.27$; $\beta = 0.24$, $CI = [0.14, 0.34]$, $SE = 0.05$, $p < .001$), compared with workers in the observer condition. One exception was happiness and well-being, where there was no difference between treatment ($M_{PM} = 4.06$, $SD = 0.27$) and control workers ($M_O = 3.93$, $SD = 0.34$, $p = 0.052$).

Workers in participatory meetings expressed more favorable attitudes toward their work group, including affiliation with the group and trust and confidence in group members, than workers in the observer condition ($M_{PM} = 4.66$, $SD = 0.18$; $M_O = 4.55$, $SD = 0.26$; $\beta = 0.11$, $CI = [0.01, 0.22]$, $SE = 0.05$, $p = 0.029$). Treatment workers also felt less lonely ($M_{PM} = 3.02$, $SD = 0.41$; $M_O = 3.28$, $SD = 0.39$; $\beta = -0.25$, $CI = [-0.41, -0.09]$, $SE = 0.08$, $p = .002$) and reported that the factory cared about and respected them to a greater extent than workers in the observer condition ($M_{PM} = 3.56$, $SD = 0.35$; $M_O = 3.15$, $SD = 0.54$; $\beta = 0.40$, $CI = [0.21, 0.59]$, $SE = 0.10$, $p < .001$).

Longitudinal attitude change. In the second wave of the survey four weeks after the end of participatory meetings, we repeated the manipulation check question. Even though they no longer participated in participatory meetings, workers in the participatory meetings condition reported more frequent discussion with group members about how to do their job well than did the control workers ($M_{PM} = 2.44$, $SD = 0.17$; $M_O = 2.25$, $SD = 0.24$; $\beta = 0.18$, $CI = [0.09, 0.27]$, $SE = 0.04$, $p < .001$).

Just as they did in Wave 1, workers assigned to participatory meetings reported higher job satisfaction ($M_{PM} = 4.05$, $SD = 0.26$; $M_O = 3.87$, $SD = 0.22$; $\beta = 0.18$, $CI = [0.08, 0.27]$, $SE = 0.05$, $p < .001$), and more sense of control at work ($M_{PM} = 3.76$, $SD = 0.27$; $M_O = 3.55$, $SD = 0.34$; $\beta = 0.22$, $CI = [0.09, 0.41]$, $SE = 0.06$, $p < .001$) compared to control workers. Again, there was no difference in reported happiness and well-being between treatment ($M_{PM} = 3.90$, $SD = 0.18$) and control workers ($M_O = 3.85$, $SD = 0.18$; $p = 0.15$).

Treatment workers continued to feel that the factory cared about and respected them ($M_{PM} = 3.40$, $SD = 0.36$) to a greater extent than the control workers ($M_O = 3.14$, $SD = 0.51$; $\beta = 0.26$, $CI = [0.09, 0.43]$, $SE = 0.09$, $p = .002$). Even though treatment workers expressed more favorable attitudes toward group life and felt less lonely in Wave 1, by Wave 2 there was no difference in attitudes toward their groups ($M_{PM} = 4.18$, $SD = 0.24$; $M_O = 4.09$, $SD = 0.28$; $\beta = 0.09$, $CI = [-0.02, 0.21]$, $SE = 0.06$, $p = 0.11$) or feelings of loneliness ($M_{PM} = 3.09$, $SD = 0.42$; $M_O = 3.23$, $SD = 0.29$; $\beta = -0.13$, $CI = [-0.28, 0.01]$, $SE = 0.07$, $p = .074$).

Section G – Working Hour Results

A workday for the factory workers starts at 8am and ends at 5pm, with a 1-hour lunch break and 45-minute dinner break. Workers are allowed to work overtime for at most 3 hours during workdays (except Saturday). Workers are compensated for their overtime hours (1.5 times their normal working piece rate). Thus there are two types of working hours – normal working hours (8am – 5pm) and overtime hours (after 5pm and anytime on weekends).

There was no difference of normal working hours between treatment workers and control workers both during the intervention ($M_{PM} = 219.03$, $SD = 23.14$; $M_O = 221.77$, $SD = 19.33$) and 6 weeks after the intervention ($M_{PM} = 225.10$, $SD = 40.00$; $M_P = 224.90$, $SD = 39.71$). However, the treatment workers spent more total hours ($M_{PM} = 374.42$, $SD = 47.27$) than control workers ($M_O = 364.77$, $SD = 38.47$), $\beta = 11.02$, $CI = [2.20, 19.84]$, $SE = 4.50$, $t = 2.45$, $p = .01$. Spreading throughout the 42 days²⁷ in the 6-week period, a worker who participated in participatory meetings on average spent 15 minutes more at work than control workers. It can be interpreted as treatment workers hanging around the production floors slightly later than the control workers. The difference in total working hours persisted 6 weeks after the end of the experiment ($M_{PM} = 353.71$, $SD = 65.56$; $M_O = 340.07$, $SD = 61.21$; $\beta = 14.84$, $CI = [5.34, 24.34]$, $SE = 4.84$, $t = 3.06$, $p = .002$). In other words, treatment workers on average stayed on the production floors (either at work or socialize with coworkers) 20 minutes longer than the control workers (see Table S7). No difference in working time was observed in the second 6-week period after the end of the experiment.

²⁷ Workers usually work from Monday to Saturday, with Sunday off.

Table S7. Results for working hours.

	<i>Dependent variable:</i>			
	During intervention		Long term	
	Normal	Total	Normal	Total
Participatory meetings	-1.749 (0.912)	11.020* (4.499)	0.951 (2.606)	14.839** (4.842)
Work experience	0.345 (0.208)	0.591 (0.784)	2.378*** (0.451)	3.252*** (0.759)
Education	0.224 (1.751)	4.387 (3.559)	-5.278 (5.072)	-6.279 (7.590)
Baseline work hours (first 6-week)	0.067*** (0.019)	0.290*** (0.057)	0.130*** (0.036)	0.298*** (0.057)
Baseline work hours (second 6-week)	-0.018* (0.008)	-0.017 (0.017)	0.005 (0.020)	0.015 (0.030)
Department fixed effects	YES	YES	YES	YES
Constant	184.532*** (6.376)	247.709*** (19.799)	176.399*** (12.669)	286.042*** (20.596)

Note:

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Section H – Pilot Balance Test and Archival Analysis

Table S8. Pilot balance test. The balance test showed there was no significant difference between workers assigned to the treatment participatory meetings and all the other factory workers for pre-treatment productivity in terms of salary.

	<i>Condition assignment</i>
Baseline productivity	-0.0001
(1 month prior)	(0.0001)
Baseline productivity	0.00001
(2 months prior)	(0.0001)
Constant	-0.743
	(0.756)

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Findings from archival salary data.

Along with the general observation in the factory, we examined a longitudinal dataset covering worker productivity in terms of gross salary of a 32-worker sewing group from June to December 2014. We offer several main findings from the dataset about worker productivity, which motivated the pilot intervention:

1. There are large variations in productivity across workers (refer to *Figure S1* and *S2*).
2. There are moderate to large within-worker variations in productivity across time (see *Figure S3*).
3. The structural factors that the factory is responsible for, like hours, overtime pay, and work assignments, do not explain all the variations in productivity (see *Table S9*).

4. More experience does not entail higher productivity; in fact, experienced workers tend to produce less than newer ones (see Table S9).

There are two types of variations in productivity: within-worker and between-worker variations. Within-worker variations refer to how much one worker's productivity varies across time (a month being a unit), whereas between-worker variations refer to how much different workers' productivity varies during the same time period (a worker being a unit). We found sizeable variations in productivity both within and between workers. However, there is a much smaller variation in working hours of each worker. Combining with qualitative evidence, we can infer that there are considerable margins in worker productivity. In other words, despite the stable long hours each worker spends at work, they are not always achieving the level of productivity that they would like to achieve.

In Table S9, we regressed workers' piece earnings on unit price, quantity, normal and overtime hours, and work experience, with fixed effects on the orders received by the group over the period. The structural factors do not explain most of the variations, even when a fixed-effect model tends to radically reduce total variation and exaggerate the R-square (Nickell, 1981). Thus we think for this reason there are group dynamics that can explain this variation, in particular the kind of group dynamics that Lewin studied and learned to manage.

Contrary to common beliefs of the workers and supervisors, work experience does not necessarily increase worker productivity. As the skills involved in sewing tasks are low, workers do not need extensive training before they become experienced in their jobs. As a worker reflected in an interview, she thought she did not work as hard at the time of the interview as

when she first got the job. We speculate nonstructural motivational factors may contribute to this difference.

The tremendous variations in workers' salary earnings under similar working hours are intriguing. The variations may come from the worker herself, such as fluctuation in motivation, stress at work, or other nonstructural factors related to her perceptions of the work at hand and her group. Through the Lewinian participatory meeting intervention, we hoped to stabilize these nonstructural variations and help the workers work better and more efficient under the same effort. From the analysis of the qualitative observation and archival salary data, we see the potential of a participatory meeting intervention to increase worker productivity and change the social outcomes, including workplace empowerment like job satisfaction, sense of control, and attitudes toward participatory work and group life, which further stabilizes a high level of productivity.

Figure S1. Gross salary variation across different workers in the month of July 2014. There were 30 active workers earning wages in July. The x-axis indicates each worker and the y-axis indicates gross salary in CNY (Chinese Yuan).

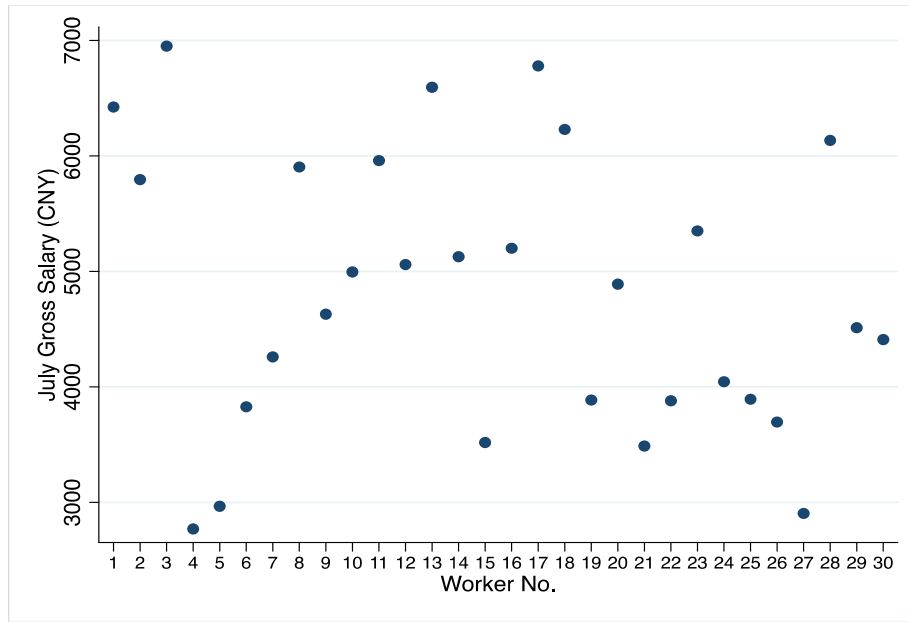


Figure S2. Hourly pay variation across different workers in the month of July 2014. There were 30 active workers earning wages in July. The x-axis indicates each worker and the y-axis indicates hourly pay in CNY (calculated from gross salary divided by total working hours in July). Note: worker 28 was paid by a fixed rate rather than piece rate; thus her hour pay was counted as 0.

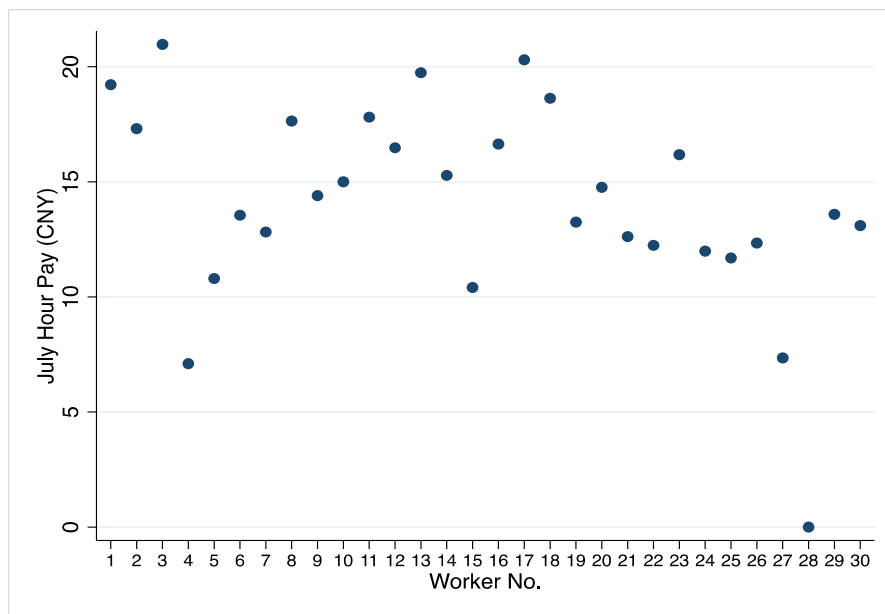


Figure S3. Gross salary variation plotted across time for each worker on one 32-worker group, from June to December 2014. The x-axis indicates months and the y-axis indicates gross salary. Note: the incomplete plots were either for workers whose wage did not depend on individual productivity (e.g. group leaders and fixed-wage workers), or workers who took a leave or left the job during this period.

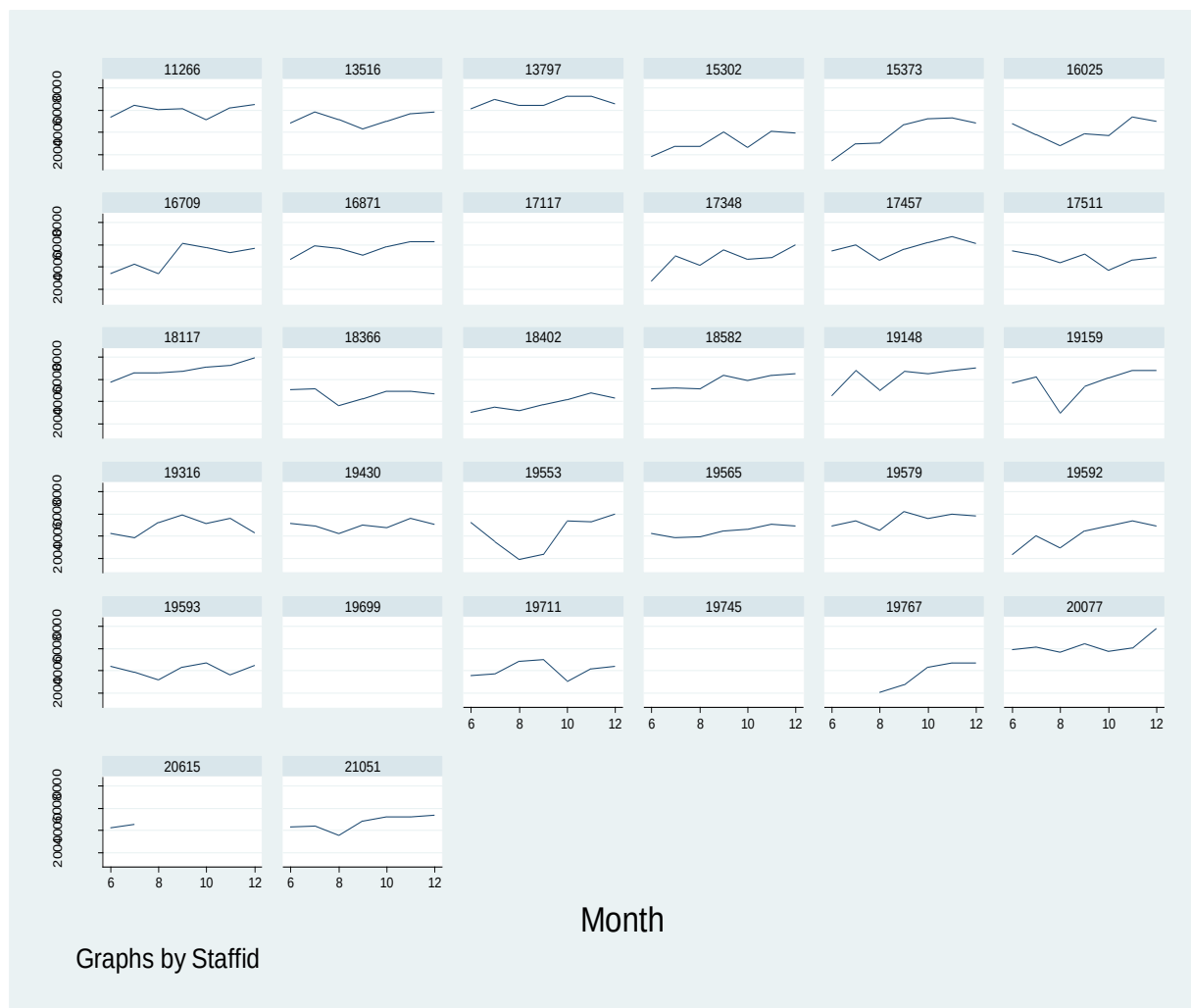


Table S9. Panel data regression table of piece earnings on unit price, quantity, working hours, and working experience, with order fixed effects. There were 58 exogenous orders received over the time period. The structural factors that the factory is responsible for, like hours, overtime pay, and work assignments, do not explain most of the variations, indicating the role of social psychological factors in determining worker productivity.

Piece Earnings	
Unit Price	25.67** (.369)
Quantity	1.27** (.018)
Normal hours	1.62** (.141)
Overtime hours	.31 (.227)
Work experience	-1.09** (.176)
Order1 FE	15.77 (27.28)
Order2 FE	-38.43 (27.58)
.	
.	
Order58 FE	-75.33 ⁺ (43.06)
Constant	-48.81 ⁺ (27.27)
R^2	0.54
N	7,606

+ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$

Table S10. Mean and standard deviations for RA reports for the six participatory meetings in the main experiment.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Six week ave.
% time spent in problem solving	22.75 (21.06)	35.13 (20.74)	44.97 (17.90)	42.84 (17.52)	60.33 (17.86)	56.69 (21.59)	43.49 (22.97)
Problem solving rating (1-4)	1.83 (0.91)	2.13 (0.63)	2.23 (0.63)	2.52 (0.81)	3.73 (1.28)	3.38 (1.20)	2.62 (1.15)
% time spent in general discussion	29.22 (18.68)	21.20 (14.88)	24.97 (11.96)	20.03 (10.82)	17.87 (9.77)	18.21 (11.02)	21.99 (13.66)
General work voice rating (1-4)	1.70 (0.70)	1.97 (0.72)	1.93 (0.69)	1.84 (0.78)	1.97 (0.76)	1.54 (0.58)	1.83 (0.72)
% time spent in nonproduction discussion	11.90 (13.40)	11.20 (16.54)	4.17 (8.21)	5.77 (9.83)	3.23 (5.69)	5.92 (11.96)	7.05 (11.80)
Nonwork voice rating (1-4)	1.87 (1.41)	2.03 (1.13)	1.63 (0.93)	1.71 (0.97)	2.03 (1.22)	1.46 (0.65)	1.80 (1.09)
Interference (1-3)	2.00 (0.82)	1.65 (0.63)	1.63 (0.72)	1.48 (0.51)	1.48 (0.64)	1.71 (0.62)	1.65 (0.67)
Scold (1-3)	1.28 (0.54)	1.50 (0.65)	1.33 (0.55)	1.21 (0.41)	1.33 (0.55)	1.29 (0.55)	1.32 (0.54)
Encouragement (1- 3)	1.53 (0.73)	1.23 (0.43)	1.27 (0.52)	1.10 (0.30)	1.13 (0.43)	1.04 (0.20)	1.22 (0.49)

Section I – Authority and Justice Results Robustness Checks

Section I1 – Robustness checks with group level t-tests

Here, we replace all the causal inferences in the results section from multiple regressions with between-group t-tests, treating group as units of analysis.

Attitudinal Changes toward Authority and Justice

General attitudes toward authority. The mean score of attitudes toward authority for the whole sample was 4.05 (SD = 0.37). This value accords with the “slightly agree” point of the scale, which indicates that, on average, workers tended to slightly agree with statements asserting complete obedience and respect for authority without question. However, workers in the participatory meetings condition reported significantly lower score in attitudes toward authority ($M = 3.87$, $SD = 0.32$) than workers in the observer condition ($M = 4.23$, $SD = 0.33$, $t = 4.36$, $p < .001$, $d = 1.08$). Participatory meetings changed participants’ attitudes toward general authority such that treatment workers registered as less authoritarian on a traditional scale of authoritarianism.

These results were consistent when we analyzed each item within the index. One month after the end of the experiment, treatment workers who took part in these brief participatory meetings were significantly less likely to endorse obedience and respect for authority as the most important virtues children should learn ($t = 2.86$, $p < .006$, $d = 0.71$), less likely to agree everybody would be better off if people would talk less and work more ($t = 5.04$, $p < .001$, $d = 1.26$), and less likely to believe in supernatural power ($t = 2.30$, $p = .020$, $d = 0.59$).

Belief in a just world. For attitudes and perceptions in generalized justice, the mean score for the whole sample was 3.98 (SD = 0.23). This value is also just below the “slightly agree” point of the scale, which indicates that, on average, workers tend to slightly agree with statements asserting belief in a just world. Workers in the participatory meetings condition

reported significantly lower score in belief on justice and fairness ($M = 3.86$, $SD = 0.22$) than workers in the observer condition who on average slightly agree on a just world belief ($M = 4.10$, $SD = 0.16$, $t = 4.93$, $p < .001$, $d = 1.24$). The results were also consistent for each individual item in the scale. There was no difference among workers with different demographics.

Perceived intergroup conflict. Participants in the treatment and control group did not differ in their perceived conflict relations between the rich people and normal people ($M_{PM} = 3.56$, $SD = 0.22$; $M_O = 3.50$, $SD = 0.23$; $p = .10$, n.s.), or between the capitalists and the working class ($M_{PM} = 3.55$, $SD = 0.27$; $M_O = 3.29$, $SD = 0.17$; $p = .26$, n.s.). However, workers in the participatory meetings condition reported more conflict between managers and workers in Chinese society than workers in the observer condition ($M_{PM} = 3.55$, $SD = 0.27$; $M_O = 3.29$, $SD = 0.17$; $t = 4.70$, $p < .001$, $d = 1.19$).

Participation outside of work. Workers in the participatory meetings condition reported higher levels of participation outside of work ($M = 4.39$, $SD = 0.19$) than workers in the observer condition ($M = 4.21$, $SD = 0.19$), $t = 3.78$, $p < .001$, $d = 0.94$. The same pattern was observed for the two spheres of participation outside of work – engagement with politics and with family life. Workers in the participatory meetings condition reported significantly higher interest in participation in politics ($M = 4.06$, $SD = 0.32$) than workers in the observer conditions ($M = 3.80$, $SD = 0.34$), $t = 3.33$, $p = .001$, $d = 0.83$. Likewise, workers in the participatory meetings condition reported significantly higher participation in family and social life ($M = 4.54$, $SD = 0.19$) than workers in the observer condition ($M = 4.41$, $SD = 0.21$), $t = 2.54$, $p = .014$, $d = 0.63$. Robustness check without the three unmatched groups in the observer condition.

Section I2 – Robustness checks with 62 groups (intact pairs).

General attitudes toward authority. The mean score of attitudes toward authority ($\alpha = .52$) for the whole sample was 4.03 ($SD = 0.36$). This value accords with the “slightly agree” point of the scale, which indicates that, on average, workers tended to slightly agree with statements asserting complete obedience and respect for authority without question. However, workers in the participatory meetings condition reported significantly lower scores in attitudes toward authority ($M = 3.86$, $SD = 0.32$) than workers in the observer condition ($M = 4.19$, $SD = 0.32$, $\beta = -0.35$, $CI = [-0.51, -0.20]$, $SE = 0.08$, $p < .001$). Participatory meetings changed participants’ attitudes toward general authority such that treatment workers registered as less authoritarian on a traditional scale of authoritarianism.

These results were consistent when we analyzed each item within the index. One month after the end of the experiment, treatment workers who took part in these brief participatory meetings were significantly less likely to endorse obedience and respect for authority as the most important virtues children should learn ($M_{PM} = 4.47$, $SD = 0.41$, $M_C = 4.77$, $SD = 0.46$; $\beta = -0.35$, $CI = [-0.56, -0.15]$, $SE = .11$, $p < .001$), less likely to agree everybody would be better off if people would talk less and work more ($M_{PM} = 4.40$, $SD = 0.40$, $M_C = 4.84$, $SD = 0.36$; $CI = [-0.66, -0.31]$, $SE = .09$, $\beta = -0.49$, $p < .001$), and less likely to have complete faith in supernatural power ($M_{PM} = 2.71$, $SD = 0.44$, $M_C = 2.95$, $SD = 0.44$; $CI = [-0.44, -0.02]$, $SE = .11$, $\beta = -0.23$, $p = .036$).

Belief in a just world. For attitudes and perceptions in generalized justice ($\alpha = .33$), the mean score for the whole sample was 3.98 ($SD = 0.23$). This value is slightly below the “slightly agree” point of the scale, which indicates that, on average, workers tended to slightly agree with statements asserting belief in a just world. Workers in the participatory meetings condition reported significantly lower score in belief in a just world ($M = 3.86$, $SD = 0.22$) than workers in

the observer condition who on average slightly agree with a just world belief ($M = 4.11$, $SD = 0.16$; $\beta = -0.27$, $CI = [-0.35, -0.18]$, $SE = 0.04$, $p < .001$). The results were also consistent for each individual item in the scale. There was no difference among workers with different demographics.

Perceived intergroup conflict. Participants in the treatment and control group did not differ in their perceived conflict relations between the rich people and normal people ($M_{PM} = 3.60$, $SD = 0.23$; $M_O = 3.50$, $SD = 0.27$; $p = .08$, n.s.), or between the capitalists and the working class ($M_{PM} = 3.56$, $SD = 0.22$; $M_O = 3.50$, $SD = 0.24$; $p = .22$, n.s.). However, workers in the participatory meetings condition reported more conflict between managers and workers in Chinese society than workers in the observer condition ($M_{PM} = 3.55$, $SD = 0.27$; $M_O = 3.29$, $SD = 0.17$; $\beta = 0.32$, $CI = [0.21, 0.42]$, $SE = 0.05$, $p < .001$). Overall, treatment workers reported a higher level of intergroup conflict than control workers on average ($\alpha = .62$; $M_{PM} = 3.57$, $SD = 0.20$; $M_O = 3.43$, $SD = 0.16$; $\beta = 0.17$, $CI = [.08, .26]$, $SE = 0.05$, $p < .001$).

Participation outside of work. Workers in the participatory meetings condition reported higher levels of participation behavior outside of work ($\alpha = .37$; $M = 4.39$, $SD = 0.19$) than workers in the observer condition ($M = 4.21$, $SD = 0.20$), $\beta = 0.17$, $SE = 0.05$, $CI = [0.08, 0.27]$, $p < .001$. The same pattern was observed for the two spheres of off-work participation behavior—engagement with politics and with family and social life. Workers in the participatory meetings condition reported significantly higher interest in participation in politics ($M = 4.07$, $SD = 0.32$) than workers in the observer conditions ($M = 3.82$, $SD = 0.34$), $\beta = 0.27$, $CI = [0.10, 0.43]$, $SE = 0.08$, $p = .001$). Likewise, workers in the participatory meetings condition reported significantly more participation in family and social life ($M = 4.54$, $SD = 0.19$) than workers in the observer condition ($M = 4.41$, $SD = 0.22$), $\beta = 0.12$, $CI = [.02, .22]$, $SE = .05$, $p = .015$.

Joint Significance Test

Because we tested the average treatment effects on multiple dependent variables, we conducted a joint significance test on the null hypothesis that the coefficients on average treatment effects from all the multiple regressions are jointly nonsignificant. As predicted, there was a jointly significant difference of the average treatment effects between workers in the participatory meetings condition and observer condition, $F(1, 58) = 7.59, p < .001$.

As a robustness check, the multivariate analysis of variance (MANOVA) was conducted to assess condition difference on all dependent variables recorded. The multivariate effect was significant by conditions, $F(1, 63) = 7.89, p < .001$. Thus, we conclude that participatory meetings significantly changed workers' attitudes compared with workers in the observer condition.

Section I3 – Robustness checks including new workers.
Attitudinal Changes toward Authority and Justice

General attitudes toward authority. The mean score of attitudes toward authority ($\alpha = .52$) for the whole sample was 4.00 ($SD = 0.37$). This value accords with the “slightly agree” point of the scale, which indicates that, on average, workers tended to slightly agree with statements asserting complete obedience and respect for authority without question. However, workers in the participatory meetings condition reported significantly lower scores in attitudes toward authority ($M = 3.84$, $SD = 0.33$) than workers in the observer condition ($M = 4.14$, $SD = 0.35$, $\beta = -0.39$, $CI = [-0.54, -0.24]$, $SE = 0.08$, $p < .001$). Participatory meetings changed participants’ attitudes toward general authority such that treatment workers registered as less authoritarian on a traditional scale of authoritarianism.

These results were consistent when we analyzed each item within the index. One month after the end of the experiment, treatment workers who took part in these brief participatory meetings were significantly less likely to endorse obedience and respect for authority as the most important virtues children should learn ($M_{PM} = 4.41$, $SD = 0.43$, $M_C = 4.64$, $SD = 0.47$; $\beta = -0.39$, $CI = [-0.59, -0.19]$, $SE = .10$, $p < .001$), less likely to agree everybody would be better off if people would talk less and work more ($M_{PM} = 4.35$, $SD = 0.40$, $M_C = 4.71$, $SD = 0.44$; $CI = [-0.70, -0.35]$, $SE = .09$, $\beta = -0.53$, $p < .001$), and less likely to have complete faith in supernatural power ($M_{PM} = 2.76$, $SD = 0.40$, $M_C = 3.06$, $SD = 0.43$; $CI = [-0.48, -0.06]$, $SE = .11$, $\beta = -0.27$, $p = .013$).

Belief in a just world. For attitudes and perceptions in generalized justice ($\alpha = .39$), the mean score for the whole sample was 3.90 ($SD = 0.24$). This value is slightly below the “slightly agree” point of the scale, which indicates that, on average, workers tended to slightly agree with statements asserting belief in a just world. Workers in the participatory meetings condition

reported significantly lower score in belief in a just world ($M = 3.83$, $SD = 0.24$) than workers in the observer condition who on average slightly agree with a just world belief ($M = 3.97$, $SD = 0.22$; $\beta = -0.25$, $CI = [-0.33, -0.17]$, $SE = 0.04$, $p < .001$). The results were also consistent for each individual item in the scale. There was no difference among workers with different demographics.

Perceived intergroup conflict. Participants in the treatment and control group did not differ in their perceived conflict relations between the rich people and normal people ($M_{PM} = 3.60$, $SD = 0.22$; $M_O = 3.51$, $SD = 0.24$; $p = .10$, n.s.), or between the capitalists and the working class ($M_{PM} = 3.56$, $SD = 0.22$; $M_O = 3.51$, $SD = 0.21$; $p = .25$, n.s.). However, workers in the participatory meetings condition reported more conflict between managers and workers in Chinese society than workers in the observer condition ($M_{PM} = 3.55$, $SD = 0.26$; $M_O = 3.29$, $SD = 0.18$; $\beta = 0.31$, $CI = [0.21, 0.42]$, $SE = 0.05$, $p < .001$). Overall, treatment workers reported a higher level of intergroup conflict than control workers on average ($\alpha = .62$; $M_{PM} = 3.57$, $SD = 0.20$; $M_O = 3.44$, $SD = 0.15$; $\beta = 0.16$, $CI = [.07, .25]$, $SE = 0.04$, $p < .001$).

Participation outside of work. Workers in the participatory meetings condition reported higher levels of participation behavior outside of work ($\alpha = .37$; $M = 4.38$, $SD = 0.19$) than workers in the observer condition ($M = 4.21$, $SD = 0.18$), $\beta = 0.19$, $SE = 0.05$, $CI = [0.09, 0.28]$, $p < .001$. The same pattern was observed for the two spheres of off-work participation behavior—engagement with politics and with family and social life. Workers in the participatory meetings condition reported significantly higher interest in participation in politics ($M = 4.07$, $SD = 0.32$) than workers in the observer conditions ($M = 3.80$, $SD = 0.33$), $\beta = 0.30$, $CI = [0.15, 0.46]$, $SE = 0.08$, $p < .001$). Likewise, workers in the participatory meetings condition reported significantly

more participation in family and social life ($M = 4.54$, $SD = 0.20$) than workers in the observer condition ($M = 4.41$, $SD = 0.20$), $\beta = 0.12$, $CI = [.03, .21]$, $SE = .05$, $p = .007$.

Joint Significance Test

Because we tested the average treatment effects on multiple dependent variables, we conducted a joint significance test on the null hypothesis that the coefficients on average treatment effects from all the multiple regressions are jointly nonsignificant. As predicted, there was a jointly significant difference of the average treatment effects between workers in the participatory meetings condition and observer condition, $F(1, 58) = 5.30$, $p < .001$.

As a robustness check, the multivariate analysis of variance (MANOVA) was conducted to assess condition difference on all dependent variables recorded. The multivariate effect was significant by conditions, $F(1, 63) = 5.63$, $p < .001$. Thus, we conclude that participatory meetings significantly changed workers' attitudes compared with workers in the observer condition.

Section I4 – Robustness checks for missing value imputation. Attitudinal Changes toward Authority and Justice

General attitudes toward authority. The mean score of attitudes toward authority ($\alpha = .52$) for the whole sample was 4.05 ($SD = 0.35$). This value accords with the “slightly agree” point of the scale, which indicates that, on average, workers tended to slightly agree with statements asserting complete obedience and respect for authority without question. However, workers in the participatory meetings condition reported significantly lower scores in attitudes toward authority ($M = 3.87$, $SD = 0.32$) than workers in the observer condition ($M = 4.20$, $SD = 0.30$, $\beta = -0.35$, $CI = [-0.48, -0.21]$, $SE = 0.07$, $p < .001$). Participatory meetings changed participants’ attitudes toward general authority such that treatment workers registered as less authoritarian on a traditional scale of authoritarianism.

These results were consistent when we analyzed each item within the index. One month after the end of the experiment, treatment workers who took part in these brief participatory meetings were significantly less likely to endorse obedience and respect for authority as the most important virtues children should learn ($M_{PM} = 4.48$, $SD = 0.39$, $M_C = 4.77$, $SD = 0.41$; $\beta = -0.32$, $CI = [-0.49, -0.15]$, $SE = .09$, $p < .001$), less likely to agree everybody would be better off if people would talk less and work more ($M_{PM} = 4.42$, $SD = 0.38$, $M_C = 4.85$, $SD = 0.34$; $CI = [-0.60, -0.28]$, $SE = .09$, $\beta = -0.44$, $p < .001$), and less likely to have complete faith in supernatural power ($M_{PM} = 2.72$, $SD = 0.43$, $M_C = 2.98$, $SD = 0.44$; $CI = [-0.45, -0.10]$, $SE = .09$, $\beta = -0.28$, $p = .002$).

Belief in a just world. For attitudes and perceptions in generalized justice ($\alpha = .32$), the mean score for the whole sample was 3.98 ($SD = 0.21$). This value is slightly below the “slightly agree” point of the scale, which indicates that, on average, workers tended to slightly agree with statements asserting belief in a just world. Workers in the participatory meetings condition

reported significantly lower score in belief in a just world ($M = 3.87$, $SD = 0.21$) than workers in the observer condition who on average slightly agree with a just world belief ($M = 4.10$, $SD = 0.15$; $\beta = -0.22$, $CI = [-0.30, -0.15]$, $SE = 0.04$, $p < .001$). The results were also consistent for each individual item in the scale. There was no difference among workers with different demographics.

Perceived intergroup conflict. Participants in the treatment and control group did not differ in their perceived conflict relations between the rich people and normal people ($M_{PM} = 3.60$, $SD = 0.22$; $M_O = 3.53$, $SD = 0.19$; $p = .16$, n.s.), or between the capitalists and the working class ($M_{PM} = 3.56$, $SD = 0.21$; $M_O = 3.49$, $SD = 0.21$; $p = .14$, n.s.). However, workers in the participatory meetings condition reported more conflict between managers and workers in Chinese society than workers in the observer condition ($M_{PM} = 3.55$, $SD = 0.25$; $M_O = 3.30$, $SD = 0.16$; $\beta = 0.28$, $CI = [0.18, 0.37]$, $SE = 0.05$, $p < .001$). Overall, treatment workers reported a higher level of intergroup conflict than control workers on average ($\alpha = .62$; $M_{PM} = 3.57$, $SD = 0.19$; $M_O = 3.44$, $SD = 0.14$; $\beta = 0.14$, $CI = [.06, .22]$, $SE = 0.04$, $p < .001$).

Participation outside of work. Workers in the participatory meetings condition reported higher levels of participation behavior outside of work ($\alpha = .37$; $M = 4.38$, $SD = 0.17$) than workers in the observer condition ($M = 4.23$, $SD = 0.16$), $\beta = 0.15$, $SE = 0.04$, $CI = [0.07, 0.23]$, $p < .001$. The same pattern was observed for the two spheres of off-work participation behavior—engagement with politics and with family and social life. Workers in the participatory meetings condition reported significantly higher interest in participation in politics ($M = 4.06$, $SD = 0.31$) than workers in the observer conditions ($M = 3.82$, $SD = 0.30$), $\beta = 0.24$, $CI = [0.11, 0.38]$, $SE = 0.07$, $p < .001$). Likewise, workers in the participatory meetings condition reported significantly

more participation in family and social life ($M = 4.54$, $SD = 0.17$) than workers in the observer condition ($M = 4.44$, $SD = 0.18$), $\beta = 0.11$, $CI = [.02, .19]$, $SE = .04$, $p = .011$.

Joint Significance Test

Because we tested the average treatment effects on multiple dependent variables, we conducted a joint significance test on the null hypothesis that the coefficients on average treatment effects from all the multiple regressions are jointly nonsignificant. As predicted, there was a jointly significant difference of the average treatment effects between workers in the participatory meetings condition and observer condition, $F(1, 58) = 8.06$, $p < .001$. As an additional robustness check, we conducted a multivariate analysis of variance (MANOVA) to assess treatment differences on all dependent variables recorded. The multivariate effect was significant by treatment, $F(1, 63) = 8.45$, $p < .001$, partial $\eta^2 = 0.44$. Thus, we conclude that participatory meetings significantly changed workers' attitudes compared with workers in the observer condition.

Section J – Authority and Justice Survey Materials

Table S2. Authority and justice survey items.

Category	Item
Participation outside of work ($\alpha = .37$)	How much impact do you feel government policies have on your daily life?
	How often do you follow news about politics, e.g. in the daily newspaper, on television, on the radio?
	How's your relationship with your family?
	How often have you participated in your family's decision making lately? (never; sometimes; often; always)
	How much influence do you intend to have on your kids or your future kids?
	How often do you socialize with your teammates off-work these days?
Attitudes toward authority ($\alpha = .54$)	Obedience and respect for authority are the most important virtues children should learn.
	If people would communicate less and work more, everybody would be better off.

	Every person should have complete faith in some supernatural power whose decisions he obeys without question.
Belief in a just world ($\alpha = .32$)	Although evil men may hold political power for a while, in the general course of history good wins out.
	It is often impossible for a person to receive a fair trial in China.
	By and large, people deserve what they get.
	Do you think most people would try to take advantage of you if they got a chance, or would they try to be fair? Please show your response on this card, where 1 means that "people would try to take advantage of you," and 6 means that "people would try to be fair".
Conflict	In your mind, to what extent do the following social groups have conflict with each other?
	The rich and the "ordinary"
	The capitalists and the working class
	Managers and workers in big Chinese society

Table S3. Study 2 survey items.

Category	Item
Attitudes toward authority ($\alpha = .55$)	Obedience and respect for authority are the most important virtues children should learn.
	If people would communicate less and work more, everybody would be better off.
	Every person should have complete faith in some supernatural power whose decisions he obeys without question.
Belief in a just world ($\alpha = .21$)	Although evil men may hold political power for a while, in the general course of history good wins out.
	It is often impossible for a person to receive a fair trial in the US. (R)
	By and large, people deserve what they get.

Table S4. *Study 1 General Attitudes Toward Authority.*

	<i>Dependent variable:</i>			
	Average	Individual items		
		(1)	(2)	(3)
Participatory meetings	-0.390*** (0.079)	-0.381*** (0.102)	-0.524*** (0.090)	-0.267* (0.109)
Gender	0.188 (0.115)	0.235 (0.122)	0.152 (0.168)	0.143 (0.198)
Marital status	-0.139 (0.258)	-0.101 (0.210)	-0.008 (0.287)	-0.303 (0.478)
Number of children	0.037 (0.050)	-0.018 (0.063)	0.039 (0.072)	0.089 (0.074)
Child at home	0.009 (0.085)	-0.073 (0.079)	0.037 (0.090)	0.092 (0.158)
Origin	-0.163 (0.183)	-0.102 (0.212)	-0.181 (0.204)	-0.203 (0.326)
Departmental fixed effects	YES	YES	YES	YES
Constant	4.402*** (0.248)	5.152*** (0.304)	4.989*** (0.241)	3.049*** (0.381)
<i>Note:</i>		*p<0.05; **p<0.01; ***p<0.001		

Table S5. *Study 1 Belief in a Just World.*

	<i>Dependent variable:</i>				
	Average	Individual items			
		(1)	(2)	(3)	(4)
condtreatment	-0.258*** (0.041)	-0.380*** (0.064)	-0.026 ⁺ (0.076)	-0.384*** (0.092)	-0.205* (0.083)
Male	0.114 (0.088)	0.026 (0.112)	0.250 (0.168)	0.247 (0.160)	-0.064 (0.161)
Single	0.011 (0.158)	0.264 (0.207)	-0.130 (0.278)	-0.234 (0.306)	0.146 (0.339)
Number of children	-0.024 (0.034)	0.022 (0.060)	0.017 (0.073)	-0.055 (0.056)	-0.064 (0.070)
Child at home	-0.020 (0.051)	-0.053 (0.067)	0.081 (0.087)	-0.118 (0.073)	0.032 (0.109)
Origin	-0.085 (0.114)	-0.036 (0.178)	0.113 (0.173)	-0.362 (0.192)	-0.052 (0.227)
	YES	YES	YES	YES	YES
Constant	4.224*** (0.138)	5.121*** (0.232)	2.314*** (0.233)	5.074*** (0.247)	4.354*** (0.268)
<i>Note:</i>		*p<0.05; **p<0.01; ***p<0.001			

Table S6. *Study 2 Attitudes Toward General Authority.*

	<i>Dependent variable:</i>			
	Average	Individual items		
		(1)	(2)	(3)
Participatory meetings	-0.439* (0.209)	-0.731* (0.316)	-0.335+ (0.269)	-0.315 (0.247)
Male	0.027 (0.245)	0.001 (0.379)	0.251 (0.276)	-0.158 (0.400)
Age	-0.004 (0.008)	-0.009 (0.014)	-0.002 (0.011)	-0.002 (0.009)
Racial minority	0.696** (0.265)	1.116* (0.437)	0.271 (0.376)	0.707* (0.287)
Education	-0.294*** (0.087)	-0.652*** (0.137)	0.024 (0.126)	-0.235* (0.110)
Work experience	0.057 (0.058)	0.015 (0.099)	0.087 (0.101)	0.059 (0.088)
Baseline productivity	-0.003 (0.003)	-0.001 (0.004)	-0.003 (0.003)	-0.004 (0.003)
Pair fixed effects	YES	YES	YES	YES
Constant	3.849*** (0.435)	6.575*** (0.930)	2.192** (0.693)	2.867*** (0.597)

Note: *p<0.05; **p<0.01; ***p<0.001

Table S7. *Study 2 Belief in a Just World.*

	<i>Dependent variable:</i>			
	Average	Individual items		
		(1)	(2)	(3)
Participatory meetings	-0.227* (0.112)	-0.285 (0.217)	-0.421* (0.241)	-0.004 (0.237)
Male	-0.275 (0.205)	-0.406 (0.318)	-0.286 (0.328)	-0.127 (0.225)
Age	0.001 (0.005)	0.0002 (0.011)	0.020 (0.016)	-0.017 (0.012)
Racial minority	0.087 (0.264)	0.125 (0.381)	-0.126 (0.338)	0.259 (0.348)
Education	-0.085 (0.067)	-0.160 (0.108)	0.049 (0.118)	-0.148 (0.113)
Work experience	-0.017 (0.059)	-0.056 (0.063)	-0.061 (0.113)	0.059 (0.107)
Baseline productivity	0.005* (0.002)	0.006 (0.003)	0.002 (0.004)	0.006** (0.002)
Pair fixed effects	YES	YES	YES	YES
Constant	4.567*** (0.441)	5.513*** (0.747)	3.746*** (0.826)	4.432*** (0.768)

Note: *p<0.05; **p<0.01; ***p<0.001

Section K – Full List of Administrative Behavioral Metrics and Statistical Models

Section K1 – Administrative behavioral metrics

Behavioral data for primary hypotheses

1. Daily Sick leave data

Variable(s)	The log of sick time taken
Variable(s)	The status of having taken a survey or not
Frequency of measure	Daily
Unit of measure	Individuals within each department

2. Staff award nomination

Variable 1	Dates of each nomination received, by department
Variable 2	Dates of each nomination approved / rejected, by department
Frequency of measure	Daily
Unit of measure	Department

3. Learn.com Registrations – data on the numbers of course sign-ups, course cancellation, and course completion, by department

Variable(s)	# of course sign-up
Variable(s)	# of course cancellation
Variable(s)	# of course completion (note, this is accurate only if the instructor updated the roster)
Frequency of measure	Monthly
Unit of measure	Department

4. New PRIME Reports – data on the number of times departments have run the new vs. old PRIME reports during the transition period

Variable(s)	#report runs of old vs new PRIME reports
Frequency of measure	One report for the date range of software transition period. This corresponds to the transition period for the old vs new reports, and is within the study period.
Unit of measure	Department

5. Turnaround Time on Expense Reports – the average number of days for approval of expense reports by department

Variable(s)	Average # of days for approval of each expense report, by department. Department is assumed to be the home department of the approver.
Frequency of measure	The report will be run for two date ranges
Unit of measure	Department

6. Effort Reports – timeliness of effort certification reports by department

Variable(s)	Average # of days for completion of effort certification, by department.
Frequency of measure	The report will be run for two date ranges
Unit of measure	Department

Behavioral data for exploratory analysis

1. Lynda.com Trainings – data on total time spent on e-learning and the number of course completions, by department

Variable(s)	Time spent on e-learning on Lynda.com
Variable(s)	% completion on training courses on Lynda.com
Frequency of measure	Daily
Unit of measure	Department

2. Use of Timeline – time series data on the number of times departments posted information in Timeline

Variable(s)	# of times department administrative staff posted information in Timeline
Frequency of measure	Weekly
Unit of measure	Department

3. SharePoint Sites and Hits – time series data on the number of sites created by department and data on hits to a SharePoint site during the intervention period by department

Variable(s)	# of page visits from admin staff on SharePoint
Variable(s)	# of unique visitors per day from admin staff on SharePoint
Variable(s)	# of sites created by admin staff on SharePoint
Frequency of measure	Daily summary
Unit of measure	Department

4. Outstanding Match Exceptions

Variable(s)	# of Match exceptions by department
Frequency of measure	The report will be run for two date ranges
Unit of measure	Department

Section K2 – Statistical models

We predict that productivity (P) and two classes of social outcomes will increase as a result of the participatory meetings treatment. We call the first class of social outcomes “workplace empowerment (E)”. The second class of social outcomes is a group of attitudes toward authority and justice outside of the workplace (A). Because A is less directly related to the intervention and might result from a generalization of changes at work to broader changes in attitudes toward familial, social, and political life, we have a lower expectation of change in A, relative to E. We will explore correlations among P, E, and A.

First, we will do a manipulation check to test whether groups assigned to the participatory meetings report more talking and knowledge of their teams. We will use the following survey questions, analyzed with the model for survey data (7) as specified below:

- How often do you talk with your team members about how to do your job well? (on a 1-6 scale: never, once or twice a month, once per week, a few times per week, frequently, all the time)
- I know about the goals and objectives of my colleagues. (from 1-strongly disagree to 7-strongly agree).

1. Analysis models for behavior data

To test the average treatment effects of participatory meetings on staff productivity, as measured by administrative behavior data, we will employ fixed effects multiple regressions based on the data structure (i.e., whether the data describe individual worker behavior or average behavior at the departmental level, and the time unit of measurement such as daily, weekly, or a sum of behaviors during the time of treatment). The general model structure includes a dummy variable indicating treatment, vector of pre-treatment covariates to improve efficiency (varied across models), and fixed effects of department pairs (used for randomization). To adjust for the theoretical bias of the FE estimator under heterogeneous treatment effects, we will center (demean) all the covariates and fully interact them with the dummy treatment indicator – call this vector **V** in all the following models.

1.1. Non-time series data on the departmental level.

Suppose a single outcome variable P of department j,

$$P_j = b_0 + b_1.D_j + b_2.Pre_j + g_j + \mathbf{V} + m_j. \quad (1)$$

$$P_j = b_0 + b_1.D_j + b_2.Pre_j + b_3.Pre.all_j + g_j + \mathbf{V} + m_j \quad (2)$$

The regression coefficient b1 represents the average treatment effect of the intervention on the outcome variable P_j measured by administrative behavioral metrics (attached in the measured variable section). D_j refers to a binary variable of experimental manipulation randomly assigned to the departments, in which D_j = 1 refers to participatory meetings condition and D_j = 0 refers to the control condition. Pre_j is the pre-treatment measurement of P. In model 2, we added an aggregate department baseline productivity Pre.all_j by averaging all the behavioral outcome

variables for each department. g_j denotes pair fixed effects in which a pair is the matched departments used as the unit of randomization (each department was randomized within its matched pair). m is a zero-mean error term, assumed to be mutually independent across departments.

1.2. Time series data on the departmental level.

Suppose the outcome variable P of department j over the time unit t ,

$$P_{jt} = b_0 + b_1.D_j + b_2.P_{jt-1} + \dots (\text{lags for } P_j) + b_3.P_{jt-365} + \dots (\text{lag terms for baseline } P_j) + g_j + V + m_j. \quad (3)$$

$$P_{jt} = b_0 + b_1.D_j + b_2.P_{jt-1} + \dots (\text{lags for } P_j) + b_3.P_{jt-365} + \dots (\text{lag terms for baseline } P_{j-365}) + c_1.Pall_{jt-365} + \dots (\text{lags for baseline } Pall_j) + g_j + V + m_j. \quad (4)$$

The regression coefficient b_1 represents the average treatment effect of the intervention on the outcome variable P_{jt} measured by administrative behavioral metrics. D_j refers to a binary variable of experimental manipulation randomly assigned to the departments, in which $D_j = 1$ refers to participatory meetings condition and $D_j = 0$ refers to the control condition. P_{jt-365} is the pre-treatment measurement of P (the same time period one year before the intervention). In model 2, we added an aggregate department baseline productivity $Pall_{jt-365}$ by averaging all the behavioral outcome variables for each department. g_j denotes pair fixed effects in which a pair is the matched departments used as the unit of randomization (each department was randomized within its matched pair). m is a zero-mean error term, assumed to be mutually independent across departments.

We will use an autoregressive time series model for panel behavioral data. We will first conduct Dickey-Fuller test for a unit autoregressive root. The number of lag terms will be determined using the BIC. If P is stationary around a deterministic linear time trend, then this trend, “ t ” (the observation number), will be added as an additional regressor.

1.3. Time series data on the individual level.

Suppose the outcome variable P for individual i in department j over the time unit t ,

$$P_{ijt} = b_0 + b_1.D_j + b_2.P_{ijt-1} + \dots (\text{lags for } P_{ij}) + b_3.P_{ijt-365} + \dots (\text{lag terms for baseline } P_{ijt-365}) + g_j + V + m_{ij}. \quad (5)$$

$$P_{ijt} = b_0 + b_1.D_j + b_2.P_{ijt-1} + \dots (\text{lags for } P_{ij}) + b_3.P_{ijt-365} + \dots (\text{lag terms for baseline } P_{ijt-365}) + c_1.Pall_{ijt-365} + \dots (\text{lag terms for baseline } Pall_{ij}) + g_j + V + m_{ij}. \quad (6)$$

The regression coefficient b_1 represents the average treatment effect of the intervention on the outcome variable P_{ijt} measured by administrative behavioral metrics. D_j refers to a binary variable of experimental manipulation randomly assigned to the departments, in which $D_j = 1$ refers to participatory meetings condition and $D_j = 0$ refers to the control condition. $P_{ijt-365}$ is the pre-treatment measurement of P (the same time period one year before the intervention). In model 2, we added an aggregate department baseline productivity $P_{allijt-365}$ by averaging all the behavioral outcome variables for each department. g_j denotes pair fixed effects in which a pair is the matched departments used as the unit of randomization (each department was randomized within its matched pair). m is a zero-mean error term, assumed to be mutually independent across (but not within) departments. We will use robust standard error clustered at the department level.

We will use the same unit root and AR test as in section 1.2.

2. Analysis models for survey data

We will measure the average treatment effects of the intervention on survey outcomes. A baseline survey has been conducted pre-treatment and a full survey conducted post-treatment.

Suppose a single survey outcome variable O for individual i in department j ,

$$O_{ij} = b_0 + b_1.D_{ij} + b_2.Z_{ij} + g_j + V + m_j. \quad (7)$$

$$O_{ij} = b_0 + b_1.D_{ij} + b_2.Z_{ij} + b_3.Pre.all_j + g_j + V + m_j. \quad (8)$$

Again, the regression coefficient b_1 represents the average treatment effect of the intervention on the outcome variable O_{ij} measured by the survey (attached in the measured variable section). D_j refers a binary variable of experimental manipulation randomly assigned to the departments. Z_{ij} is a vector of individual-level staff characteristics that are unaffected by the treatment (gender, age, ethnicity, education, and work experience). In model 2, we further include $Pre.all_j$, a vector of aggregate department baseline behavioral productivity to improve efficiency. g_j denotes pair fixed effects. m is a zero-mean error term, assumed to be mutually independent across (but not within) departments. We will use robust standard error clustered at the department level.

Because we will test several regressions for each of our hypotheses, we will use a joint significance test of the null that all of the regressions are nonsignificant for each hypothesis.

Section L – Academic Staff Survey Materials

Section L1 – Departmental metrics visit form

Department: _____

Date: _____

Your name: _____

Ask:

1. **If/how the department tracks attendance or RSVPs to their events. Do they track only for certain types of events (i.e., welcome events, but not brown bags?) How many events in the coming weeks?**
2. **How is the department's website updated? Do they have an automated content management system? Is it updated manually? From within the department?**
3. **How they track IT requests (i.e., PSY/PNI helpdesk opens tickets for requests). Do they have some type of worklog?**
4. **If they keep records of building/fire code compliance. What needs inspection (e.g., elevators, egress), and with what frequency?**
5. **Who procures course/lab materials? Do they keep any records, and if so, do we have access to previous years'?**
6. **Who's in charge of Concur submissions? Do you keep a records of some statistics like the volume, and time approved?**
7. **Similarly with ORPA.**
8. **Do you keep your emails sent to the department listserv? We are interested in some meta-data. Do you think things like the volume of emails and rate of reply reflect how well your department communicate? Ask for inbox counts of "to: [dept. Listserv]"**
9. **Do they use Salesforce or similar platforms with data we can track?**
10. **Is there some other measurable metrics that reflect the general progress of your team, and how well your staff work both alone and collectively? [open-ended]**

Observe (don't ask!):

1. **How closely do staff sit together?**

1	2	3	4	5	6	7
All far from each other						All close to each other

2. **How friendly are staff to each other?**

1	2	3	4	5	6	7
Not at all friendly						Very friendly

Section L2 – Endline survey for staff members

The last 6 digits of your ID will help us keep track of your responses, beginning to end. All your responses to this survey are kept confidential; we cannot use that information to track who you are. This survey remains anonymous. The research team will be the only party that will have access to your data.

Please write the last 6 digits of your PUID number (the number underneath the barcode on your Princeton ID card).

1. How often do you learn from your colleagues about how to do your job well?

1	2	3	4	5	6
never	once or twice a week	once per week	a few times a week	frequently	all the time

Please indicate the extent to which you agree with the following statements:

2. I know about the goals and objectives of my colleagues.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

3. All in all I am satisfied with my job.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

4. In general, I don't like my job.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

5. Being frustrated comes with this job.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

6. To what extent do you have control over what happens on your job?

1	2	3	4	5	6	7
not at all			somewhat			very much

7. I sometimes feel I am being pushed around in my job.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

8. There is really no way I can solve all the problems I have at work.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

9. I feel comfortable speaking up in meetings with colleagues and supervisors.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

10. I feel comfortable talking to my colleagues and supervisors when a work problem occurs.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

11. The treatment that I have generally received here at the dept/institute/center/program name has been fair.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

12. I feel that my direct supervisor listens to me.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

13. The University authority cares about and respects me.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

14. In the dept/institute/center/program name, colleagues support me through collaboration when I need it.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

15. In the dept/institute/center/program name, employees are encouraged to report important information up the line, even if it is “bad news.”

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

16. In the dept/institute/center/program name, different opinions about how to solve work problems are welcome.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

17. I am encouraged to be innovative in my job (that is, to try new ways of doing things).

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

18. To what extent do you think your team communicates well?

1	2	3	4	5	6	7
not well at all			somewhat well			very well

19. How do you like your colleagues in the dept/institute/center/program name?

1	2	3	4	5	6	7
not at all			somewhat			very much

20. How often do you socialize with your colleagues from the Philosophy department throughout the work day?

1	2	3	4	5	6	7
not at all			sometimes			very often

21. I feel part of a team that works well together in the dept/institute/center/program name.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

22. I have confidence and trust in my coworkers.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

23. I feel lonely in the dept/institute/center/program name.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

24. Obedience and respect for authority are the most important virtues children should learn.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

25. If people would communicate less and work more, everybody would be better off.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

26. Every person should have complete faith in some supernatural power whose decisions he obeys without question.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

27. Although evil men may hold political power for a while, in the general course of history good wins out.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

28. It is often impossible for a person to receive a fair trial in the US.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

29. By and large, people deserve what they get.

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

30. In your mind, to what extent do the following social groups have conflict with each other?

A. Supervisors and their direct reports at the dept/institute/center/program name?

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

B. Administrative staff and faculty at the dept/institute/center/program name?

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

C. The rich and the poor in the U.S.?

1	2	3	4	5	6	7
strongly disagree			neither disagree or agree			strongly agree

31a. Do you frequently delete your work emails? ____ yes ____ no

For the next part of this survey, please go to your computer:

**Step 1: Open your Princeton email via Outlook Web App (owa.princeton.edu), *not* the desktop app.
Go to your Inbox.**

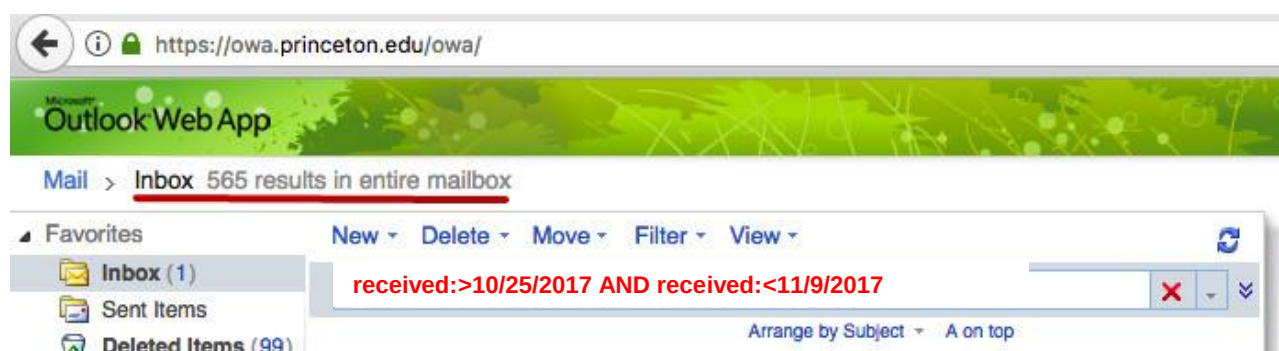
Step 2: Find the search box on the left panel. Click open the arrow and select **"This Folder"**.



Step 3: How many emails have you gotten in total since [date of last participatory meeting]? Here is how to find out:

Type in the date range for search with this format: **received:> [date of last participatory meeting] AND received:< [survey date]**
Press “Enter” on keyboard to display results.

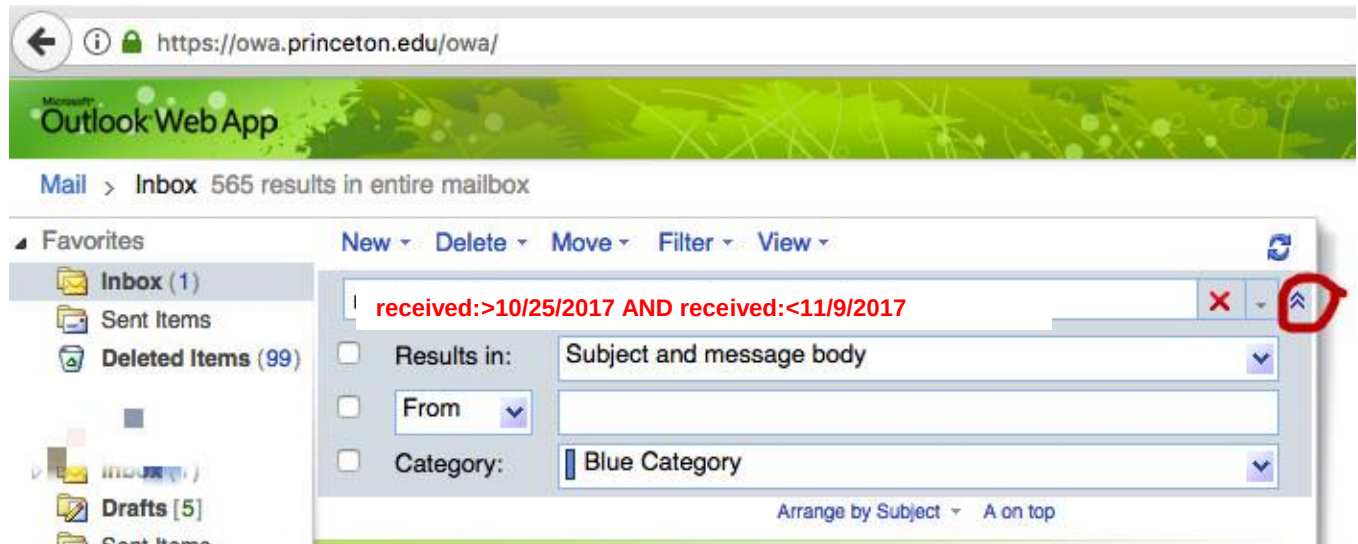
31. Write down the number of total emails displayed here: _____. (see example screenshot below!)



Are you the department manager? ____ yes ____ no

if yes, please skip to Step 6.

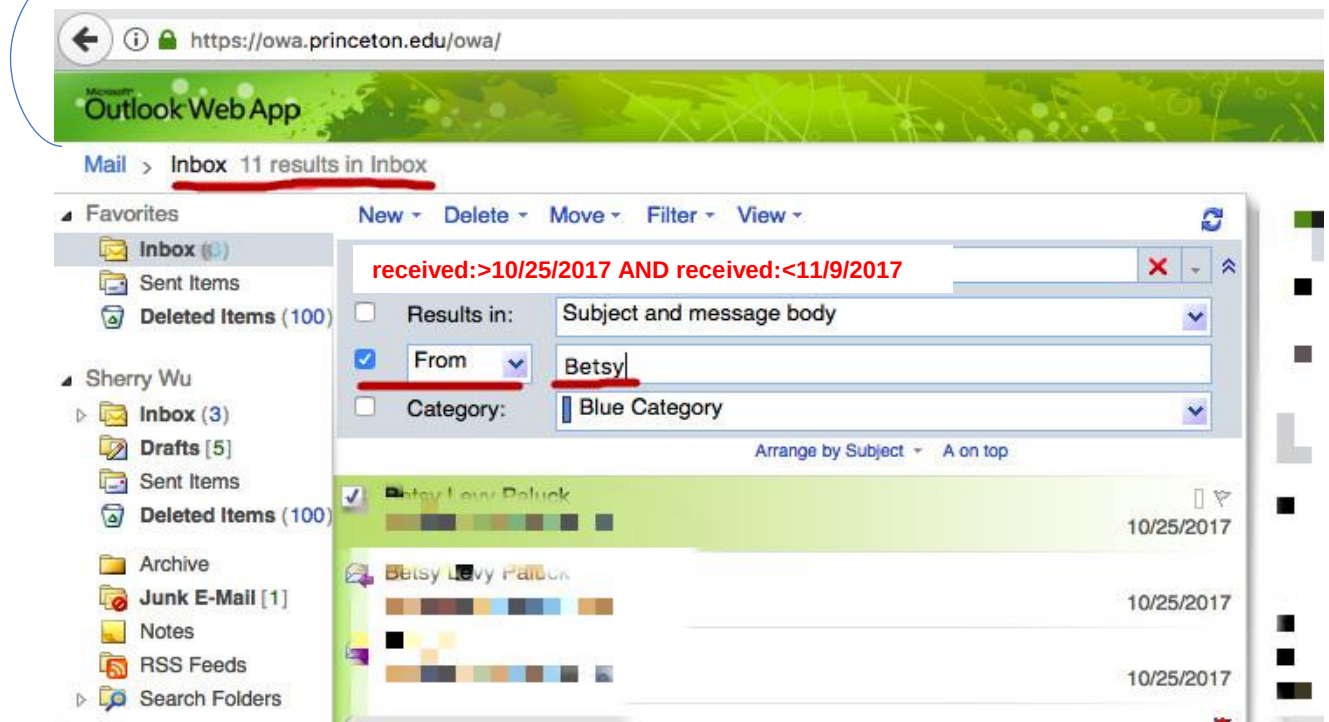
Step 4: Now we are interested to know how many emails you have received from your department manager! Click open the arrow button by the right to display “Advanced Search” options.



Step 5: Check the box next to “**From**”, and enter in the name of your direct supervisor (department manager).

Press “Enter” on the keyboard.

32. Write down the number of emails received here! _____

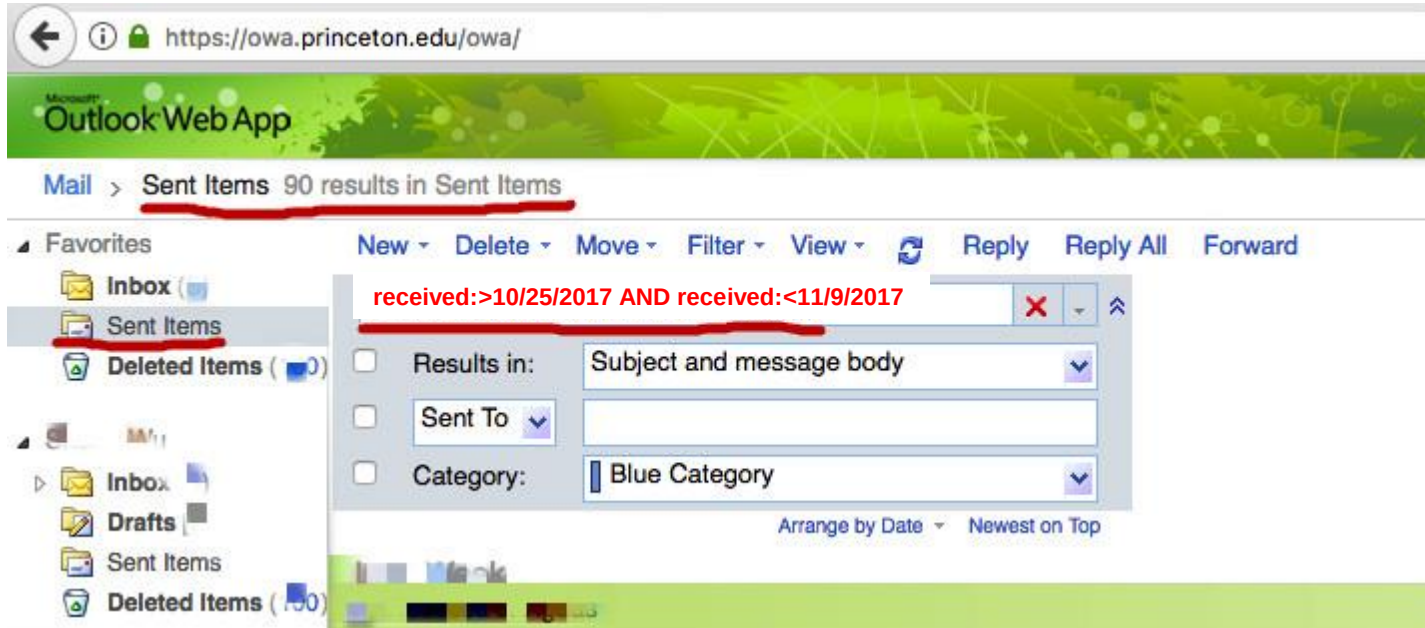


Step 6: Now let's find out how many emails you have sent in total since 10/25/17. Go to your "**Sent Items**" folder.

Type in the same date: **sent:> received:> [date of last participatory meeting] AND received:< [survey date]**

Press "Enter" on the keyboard.

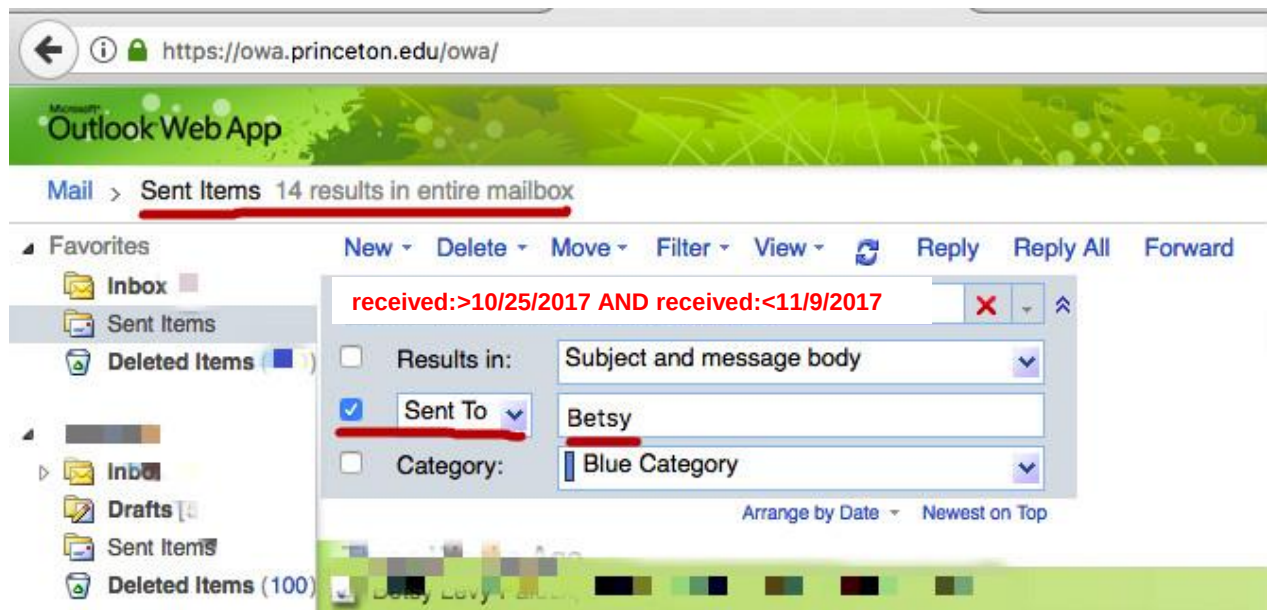
33. Write down the number of emails received here: _____



Step 7: Finally, how many emails have you sent to your direct supervisor (department manager)?

In the “Advanced Search” options, click the box and choose “**Sent To**”
Enter in the name of your direct supervisor (department manager).
Press “Enter” on keyboard to display results.

34. Write down the number of total emails here: _____



[Questions 35-43 are only visible to staff groups in the treatment condition.]

35. Are you continuing the participatory meetings?

☐ yes ☐ no

36. If yes, how often?

☐ weekly ☐ biweekly ☐ monthly ☐ less than monthly

37. How do you like the weekly participatory meetings?

1	2	3	4	5	6	7
not at all			somewhat			very much

38. How novel was this meeting style for the team?

1	2	3	4	5	6	7
not at all			somewhat			very much

39. Do you feel you wasted time participating in the meetings?

1	2	3	4	5	6	7
not at all			somewhat			very much

40. Did any new ideas about your work, or innovations for teamwork result from these meetings?

☐ yes, all the time ☐ yes, a few times ☐ yes, once or twice ☐ no

41. Would you like to describe what came out of the meeting?

42. What do you find most helpful from these meetings?

43. What do you find least helpful from these meetings?

44. What is your gender identity?

☐ male ☐ female ☐ other: _____

45. What is your age?

years

46. What is your racial or ethnic background? (Check all that apply)

- ☐ Latinx or Hispanic
☐ Black or African-American
☐ Asian/Pacific Islander or Asian-American
☐ White or European-American
☐ Indigenous: _____
☐ Other: _____

47. What is the highest level of school you have completed or the highest degree you have received?

- ☐ high school
☐ some college but no degree
☐ associate degree in college (2-year)
☐ bachelor's degree in college (4-year)
☐ master's degree
☐ doctoral degree
☐ professional degree (JD, MD)

48. How long have you been working in your department?

- ☐ less than a year
☐ 1 to 3 years
☐ 3 to 5 years
☐ 5 to 7 years
☐ more than 7 years

Participatory meetings guide

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Campus Behavioral Science Initiative

Thank you for joining this project! This is one of the first studies of its kind at Princeton, and we are so happy you are involved.

This guide contains an overview of what is involved in a participatory meeting, and a detailed outline for each of the six meetings you will hold with staff.

We hope this guide will make your participation as effortless as possible. You know your team best and we welcome your input on how to adapt these meetings to your particular needs.

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What is a participatory meeting?

Participatory meetings are gatherings that invite staff to voice their work challenges and goals, with a leader guiding the discussion. The meetings involve you and your direct reports, as well as other staff who you think could benefit from the meeting. The number of staff attending the meeting could be as few as 2 people, and as many as 15. We don't recommend inviting more than 15 people to the meeting.

For this study, we ask that you hold one participatory meeting each week for six weeks. Each meeting is roughly 20 minutes long. We recommend that you hold your participatory meetings on Mondays or Tuesdays at a fixed time window that works for everyone in your team. But as with all of our recommendations, we hasten to add: you know your team best, and can adjust these recommendations to your particular departmental needs and schedule.

Every meeting should involve three parts:

1. The team discusses the topic of the week,
2. The manager (you!) summarizes the discussion, &
3. Each staff member sets a goal for the week.

In our week-by-week meeting guide, we suggest language for how you can introduce each part of the meeting, but we welcome you to translate our suggestions into your own language and leadership style. The most important goal for each meeting is to invite staff participation and involvement in the discussion topic and in goal-setting.

Introducing meetings & the study to your staff

When introducing these meetings to your staff, we suggest three main points:

1. Mention that this is part of a campus-based learning initiative to adopt new workplace teamwork techniques
2. Techniques are aimed at helping teams to work together more efficiently, and to increase satisfaction with work.
3. [Please feel free to include your own goals and reasons for participating in the study, driven by your own department needs or management philosophy!]

On the next page, we describe the three parts of the meeting, and what you can hope to accomplish in each part.

Please keep this participatory meeting manual for yourself, and do not discuss with other departments. We encourage you to discuss the study with members of our research team any time. You can discuss the study with other department managers after the study has concluded!

Meeting leadership

The general goals for your leadership of these meetings is to encourage your team members to bring up and discuss their own work challenges, share effective strategies, and problem-solve barriers. Our initial evidence suggests that doing so will help your staff to work more effectively and happily. You may already be doing something very similar!

Meetings are not a time to single out anyone. Your employees are all experts in their own fields. The purpose is to bring out their individual wisdom and insights about work challenges and barriers, and to share these with the team.

In these meetings, your primary role is a discussion leader who facilitates your group discussion, encourages your staff to speak up, and engages them in active, team problem-solving on work-related issues. Managers should allow the staff to talk for most of the time during the participatory meeting. Our aim is for your team to engage and check in with each other, not to ask you to give a lecture during your already busy schedule.

We offer many recommendations about these meetings, but they can be adjusted to fit your particular department needs and schedule. You know your team best.

A. Weekly discussion topic

10-15 minutes

During the first meeting, you will set the idea of participation and discussion as a clear expectation, and get your team familiarized with the structure of the brief meeting.

Starting from the second week, you will bring up a general topic to discuss, using 1-2 questions suggested in our meeting guide. Each topic is very general so that you and your team can apply it to the work that is going on in your specific department.

The number of discussion questions is secondary to the depth of the discussion--so if you only pose one question to your staff because the resulting discussion is very active, that's fine!

B. Your summary

1-3 minutes

We ask that you summarize what you've heard from your staff as you close the meeting. The goal of the summary is to show your team that you've heard them and to use this time as a way to wrap up the issues that have been raised and to move on to goal setting (described next).

In your summary, try to focus on what you are hearing from your team, and avoid summarizing your own judgments of what you're hearing. Of course, if your team is asking for your input, feel free to give it!

At the end of your brief summary, provide your team an overview of what is ahead for this week (even if it doesn't affect every single person in the team, they will know better what you and the rest of the team are facing). This overview provides a transition for your team into their individual goal setting, which happens next.

C. Setting goals

4-9 minutes

At the end of the meeting, you will encourage team members to take turns stating an individual work goal for the current week. Please ask each staff member to voice a concrete goal (e.g., “I’m going to try to approve all Concur submissions”), followed by a short plan to achieve that goal (e.g., “I’m going to set aside two hours each day when I just focus on that.”).

Concrete goals may look like:

- “I will finish xyz faculty’s grant submission by this Friday”,
- “I will make progress on preparing the departmental conference, and will send the welcome packages to the new grad students”, or
- “This week, I will focus on taking care of half of the items on my to-do list during X time of day when I know that students and faculty are less likely to drop by and ask for my time.”
- “I will take care of 3 new employees’ work visas.”

You can encourage your team members to be as specific as possible in their goals and even to spell out their plan for accomplishing them, if time remains.

Close by thanking your team and reminding them about the next week’s meeting. You’re all done!

Wrap-up & additional thoughts

Your main goal is to encourage participation in these discussions about work.

Please try to steer focus away from non-work-related discussion or complaints.

If you discover a problem (work-based or relationship-based) in the meeting, try to discuss that problem with individual team members outside of the meeting, so as to keep the meeting positive and team-focused.

The meetings are meant to be brief (and thus easy to integrate into your week!). Please try to keep your time to 20 minutes, and definitely tie up ends before you reach 35 minutes.

Meeting 1 guide

Meeting 1 guide

Topic: Setting expectations for the participatory meetings.

Note: you (the manager) will talk a bit more in this meeting compared to all the other participatory meetings.

A. Discussion topic (10-15 minutes)

First week introduction:

- “This is part of a campus-based learning initiative to test new workplace teamwork techniques”
- “The reason I wanted to try out these meetings is...”

Discussion questions:

- “What are our big events and challenges coming up this September and October for us as a team?”
- “What do we want to accomplish as a team this September and October?”

B. Your summary (1-3 minutes)

First, summarize what you heard. Then provide a brief overview of what you are focused on this week, any events in the department, or any projects you would like to see move ahead.

- “OK, thanks—here’s what I’ve heard...”
- “Here’s what is ahead for us this week...”

C. Setting goals (4-9 minutes)

- “Can we go around and each say what is an important goal for the week (what we want to get done, or make progress toward) and how we’re going to achieve that work goal?”
“Please be really specific even if not everyone knows what you’re talking about.”

Meeting 1 survey

Department (abbrev.):	Meeting start and end time (e.g. 10am-10:30am):
Date:	Attendance (# of people present, including you):

During discussion of this week's topic, how many team members participated?

1 2 3 4 5 6 7
 Almost no one Half of team All of team
 participated participated participated

Roughly how much of the discussion of this week's topic focused on *problem-solving work challenges*?

1 2 3 4 5 6 7
 Almost none of Half of the time Most of the time
 the time

Roughly how much of the discussion of this week's topic focused on *non-work or tangential issues*?

1 2 3 4 5 6 7
 Almost none of Half of the time Most of the time
 the time

Did each team member voice their work goals in front of the team? (check one)

___ everyone did ___ the majority did ___ only a few ___ nobody

In your opinion, how ambitious were the goals?

1 2 3 4 5 6 7
 All goals were Goals were mixed All goals were
 easy between easy and ambitious
 ambitious

Optional: Do you have any additional comments about how this week's meeting went?

Meeting 2 guide

Meeting 2 guide

Topic: How do you get things off your checklist?

A. Topic discussion (10-15 minutes)

- “What strategies help you to work efficiently?”
- Follow-up question: “Or in a more focused way? Or in a more effective way?”

B. Your summary (1-3 minutes)

First, summarize what you heard. Then provide a brief overview of what you are focused on this week, any events in the department, or any projects you would like to see move ahead.

- “OK, thanks—here’s what I’ve heard...”
- “Here’s what is ahead for us this week...”

C. Setting goals (4-9 minutes)

- “Can we go around and each say what is an important goal for the week (what we want to get done, or make progress toward) and how we’re going to achieve that work goal?”
“Please be really specific even if not everyone knows what you’re talking about.”

Meeting 2 survey

Department (abbrev.):	Meeting start and end time (e.g. 10am-10:30am):
Date:	Attendance (# of people present, including you):

During discussion of this week's topic, how many team members participated?

1 2 3 4 5 6 7
 Almost no one Half of team All of team
 participated participated participated

Roughly how much of the discussion of this week's topic focused on *problem-solving work challenges*?

1 2 3 4 5 6 7
 Almost none of Half of the time Most of the time
 the time

Roughly how much of the discussion of this week's topic focused on *non-work or tangential issues*?

1 2 3 4 5 6 7
 Almost none of Half of the time Most of the time
 the time

Did each team member voice their work goals in front of the team? (check one)

___ everyone did ___ the majority did ___ only a few ___ nobody

In your opinion, how ambitious were the goals?

1 2 3 4 5 6 7
 All goals were Goals were mixed All goals were
 easy between easy and ambitious
 ambitious

Do you have the impression that people achieved their goals raised in the last meeting?

1 2 3 4 5 6 7
 Most people did I think about half did Most people
 not achieve their and half didn't achieve achieved their
 goals their goals goals

Optional: Do you have any additional comments about how this week's meeting went?

Meeting 3 guide

Meeting 3 guide

Topic: Communicating mistakes

A. Topic discussion (10-15 minutes)

- “We all make mistakes, particularly during busy times of the year like this one. What are some of your strategies for double checking, proofing, or otherwise catching errors in your work?”
- “What are your best strategies (at Princeton or at previous jobs) for communicating if you’ve made or found a mistake, in a way that has diminished stress or been very helpful?”

B. Your summary (1-3 minutes)

First, summarize what you heard. Then provide a brief overview of what you are focused on this week, any events in the department, or any projects you would like to see move ahead.

- “OK, thanks—here’s what I’ve heard...”
- “Here’s what is ahead for us this week...”

C. Setting goals (4-9 minutes)

- “Can we go around and each say what is an important goal for the week (what we want to get done, or make progress toward) and how we’re going to achieve that work goal?”
 “Please be really specific even if not everyone knows what you’re talking about.”

Meeting 3 survey

Department (abbrev.):	Meeting start and end time (e.g. 10am-10:30am):
Date:	Attendance (# of people present, including you):

During discussion of this week's topic, how many team members participated?

1 2 3 4 5 6 7
 Almost no one Half of team All of team
 participated participated participated

Roughly how much of the discussion of this week's topic focused on *problem-solving work challenges*?

1 2 3 4 5 6 7
 Almost none of Half of the time Most of the time
 the time

Roughly how much of the discussion of this week's topic focused on *non-work or tangential issues*?

1 2 3 4 5 6 7
 Almost none of Half of the time Most of the time
 the time

Did each team member voice their work goals in front of the team? (check one)

___ everyone did ___ the majority did ___ only a few ___ nobody

In your opinion, how ambitious were the goals?

1 2 3 4 5 6 7
 All goals were Goals were mixed All goals were
 easy between easy and ambitious
 ambitious

Do you have the impression that people achieved their goals raised in the last meeting?

1 2 3 4 5 6 7
 Most people did I think about half did Most people
 not achieve their and half didn't achieve achieved their
 goals their goals goals

Optional: Do you have any additional comments about how this week's meeting went?

Meeting 4 guide

Meeting 4 guide

Topic: Juggling tasks

A. Topic discussion (10-15 minutes)

- “What are some challenges you’ve faced lately in juggling tasks?”
- “What are some of your best strategies for managing multiple tasks?”

B. Your summary (1-3 minutes)

First, summarize what you heard. Then provide a brief overview of what you are focused on this week, any events in the department, or any projects you would like to see move ahead.

- “OK, thanks—here’s what I’ve heard...”
- “Here’s what is ahead for us this week...”

C. Setting goals (4-9 minutes)

- “Can we go around and each say what is an important goal for the week (what we want to get done, or make progress toward) and how we’re going to achieve that work goal?”
“Please be really specific even if not everyone knows what you’re talking about.”

Meeting 4 survey

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Optional: Do you have any additional comments about how this week's meeting went?

Meeting 5 guide

Meeting 5 guide

Topic: Team coordination

A. Topic discussion (10-15 minutes)

- “What do you do when coordination or cooperation is difficult?”
- “Do you have a particular communication method or technology that you use to improve coordination? Are there ways we can coordinate better among our team?”

B. Your summary (1-3 minutes)

First, summarize what you heard. Then provide a brief overview of what you are focused on this week, any events in the department, or any projects you would like to see move ahead.

- “OK, thanks—here’s what I’ve heard...”
- “Here’s what is ahead for us this week...”

C. Setting goals (4-9 minutes)

- “Can we go around and each say what is an important goal for the week (what we want to get done, or make progress toward) and how we’re going to achieve that work goal?”
“Please be really specific even if not everyone knows what you’re talking about.”

Meeting 5 survey

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Optional: Do you have any additional comments about how this week's meeting went?

Meeting 6 guide

Meeting 6 guide

Topic: Manager's choice!

A. Topic discussion (10-15 minutes)

- Please facilitate a discussion topic tailored to your specific team.
E.g., if a team's major concern/challenge is its coordination, then focus more on this topic, etc.

B. Your summary (1-3 minutes)

First, summarize what you heard. Then provide a brief overview of what you are focused on this week, any events in the department, or any projects you would like to see move ahead.

- "OK, thanks—here's what I've heard..."
- "Here's what is ahead for us this week..."

C. Setting goals (4-9 minutes)

- "Can we go around and each say what is an important goal for the week (what we want to get done, or make progress toward) and how we're going to achieve that work goal?"
"Please be really specific even if not everyone knows what you're talking about."

Meeting 6 survey

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Optional: Do you have any additional comments about how this week's meeting went?

Team campus address: Peretsman-Scully Hall, Room 424 *When all meetings are finished, please send back your meeting surveys via campus mail!*

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