



ARTICLE



<https://doi.org/10.1057/s41599-024-02770-7>

OPEN

Antecedents and consequences of telework during the COVID-19 pandemic: a natural experiment in Japan

Hiina Domaë^{1✉}, Masataka Nakayama¹, Kosuke Takemura², Yasushi Watanabe¹, Matthias S. Gobel³ & Yukiko Uchida¹

Amidst the global COVID-19 pandemic, telework (remote work) has become a widespread practice adopted by companies worldwide. However, Japan has notably maintained a low rate of telework implementation, suggesting cultural factors hindering its adoption. This study aimed to elucidate the antecedents and consequences of teleworking in Japan. Leveraging the natural experiment created by the COVID-19 pandemic, we addressed two key questions: (1) What socio-psychological factors in Japanese workplaces were important for implementing telework in the first place? and (2) How did the implementation of telework subsequently influence socio-psychological factors in these workplaces? Employees from various Japanese companies completed three waves of an online survey before and during the pandemic. Results showed that telework was more likely to be implemented in organizations characterized by a meritocracy. Results also showed that the implementation of telework demonstrated no measurable negative effects but instead increased levels of independence, organizational commitment, and perceived hierarchy mutability.

¹Kyoto University, Kyoto, Japan. ²Shiga University, Hikone, Japan. ³University of Sussex, Brighton, UK. ✉email: hiina936@gmail.com

Introduction

During the COVID-19 pandemic, many companies worldwide implemented telework (i.e., remote work) to prioritize the health and safety of their employees. Three years later, telework has become the “new normal” for many people, and it is unlikely to disappear from our lives even after the pandemic has ended. In fact, some companies have adopted a hybrid form of telework, allowing employees to choose flexible work arrangements either in the office or from home (The Economist, 2020). To ensure the productivity and well-being of teleworking employees, it is crucial to clarify what factors facilitate the implementation of telework and to understand its consequences for companies and their employees, especially when telework is implemented in culturally sensitive ways. As reviewed below, current research on telework is predominantly based on data from Western societies. Moving towards more culturally diverse research on telework, we present empirical data on the antecedents and consequences of telework in the Japanese cultural context.

A meta-analysis found that teleworking was associated with positive outcomes in terms of productivity, retention, commitment, and performance (Brittany and MacDonnell, 2012). However, this meta-analysis, like most other studies investigating the effects of telework to date, is limited in that it focused on employees from Western societies (Brittany and MacDonnell, 2012; Peters et al., 2016; Venkatesh, 2020; but see Adamovic, 2022; Bloom et al., 2014 for notable exceptions). Thus, it remains mostly unknown whether and how these findings can be generalized to non-Western societies (Alexandra Beaugard et al., 2019), and assuming the universality of these findings might be premature. For example, telework rates substantially differed across countries during the COVID-19 pandemic. According to one survey conducted in July 2020, Western countries had telework rates of 50–61%, whereas Japan had a telework rate of 31%, which was the lowest among the eight developed countries surveyed (Mori, 2021). Japan’s telework rate was also lower compared to other East Asian countries, with South Korea having a telework rate of 37%, for instance (Mori, 2021).

One explanation for the lower adoption of telework in non-Western societies, particularly in Japan, could be that telework might be perceived as having a more negative impact on non-Western work contexts. As a result, it may not be implemented or, if implemented, may not last long. Despite Japan not lagging behind other developed countries in terms of possessing the information technology infrastructure needed for teleworking, there seem to be other factors that could have hindered the implementation of telework in Japan during the pandemic.

In the following section, we review theories and empirical observations in support of the idea that cultural factors specific to Japanese society may have hindered the implementation of telework during the pandemic and/or resulted in negative consequences after its implementation. We use a theoretical framework that views culture as a collection of interacting systems of ideas, institutions, interactions, and individuals that are inextricably connected and mutually constitutive (Hamedani and Markus, 2019). This multi-layered perspective of culture has proven useful in understanding socio-hierarchical relationships in organizations (e.g., Gobel and Miyamoto, 2023). Thus, we apply this framework to organizational contexts to understand how the antecedents and consequences of telework (i.e., a new institution) are embedded within the interacting systems of institutions (e.g., employment and remuneration system), interactions (e.g., working, management, and communication styles), and individuals (i.e., psychological and behavioral tendency such as social orientation).

Antecedents of telework. Social institutional factors might have hindered the implementation of telework in Japan during the pandemic. These factors include life-long employment coupled with its seniority-based remuneration system. Despite the gradual shift away from these traditional systems towards more performance-based pay over the last three decades, the original systems persist in Japanese organizations (Ogihara, 2017), with individual performances still given less weight in determining remuneration (Uchida et al., 2022).

Under life-long employment, job and relational mobility are low, as employees build stable relationships with colleagues and develop greater loyalty towards their organization. However, and somewhat counterintuitively, research shows that in such contexts, generalized trust is also low (Thomson et al., 2018). Social relationships must be externally assured through (mutual) monitoring and sanctioning systems (Yamagishi et al., 1998; Yamagishi and Yamagishi, 1994). For example, when employees engage in mutual monitoring, it ensures continuous commitment to colleagues. Once such a monitoring system becomes a habitual interaction style, employees need to continuously show commitment signals to colleagues. Managers closely monitor employees’ behaviors and intervene in every minor decision-making process to ensure that employees are committed to their work. Micro-management becomes more prevalent (Iwashita, 2021; Ono, 2022). Similarly, evaluations become more process-oriented (rather than performance-based) because the process itself (e.g., how long an employee worked) provides an important commitment signal (Iwashita, 2021; Ono, 2022). In Japan, these social institutions are embodied and habitualised as the interaction rule that “formal business transactions must be (i) in-person, (ii) on paper, and (iii) with a stamp of approval” (Ono, 2022). We reasoned that in Japan, telework would be perceived as being potentially disruptive to the existing social institutions of employment and remuneration systems as well as existing interaction styles of monitoring, micro-management, and process-oriented appraisals. Thus, we expected Japanese organizations to be less likely to implement telework due to the anticipated costs of disrupting the established working and management processes.

Additional psychological and behavioral factors at the individual level might have also impeded the implementation of telework in Japan during the pandemic. In contexts of low relational mobility, such as Japan, group members tend to focus more on information about the social context (San Martin et al., 2019). Thus, the lower relational mobility in Japan goes hand in hand with context-dependent Japanese communication styles (Fujiwara and Takemura, 2023; Hall, 1973). High-context communication in Japan considers situational factors, including non-verbal behaviors, alongside direct verbal messages. In the Japanese workplace, skills are also highly contextualized within each organization, and on-the-job training is the predominant form of training (Iwashita, 2021). Contextualized skills encompass not only job-related tasks but also communication within the workplace. Thus, in Japanese and East Asian cultural contexts, individuals are often perceived as more connected to each other and to the surrounding social context, a concept known as interdependence (Markus and Kitayama, 1991). Interdependence aligns with the working style in the Japanese organizational contexts (Kitayama et al., 2016), where employees closely communicate and spend long hours working together daily, fostering a strong sense of dependence on one another. Prioritization of teamwork (Iwashita, 2021) and group-based agency (Zemba et al., 2006) may also reflect interdependence. However, telework creates a physical distance among employees, potentially disrupting skill acquisition and communication through intensive in-person interaction while

simultaneously increasing the individual agency and responsibility for each person's work.

Hierarchy is another critical factor to consider when studying the effects of telework because it is constructed by and influences the layers of culture from institutions to individuals (Gobel and Miyamoto, 2023). At the institutional level, Japanese organizations are governed by a strong vertical hierarchy where an individual's rank is determined by status, seniority, and years of service (Hendry, 2019; Nakane, 1970; Ono, 2022). Given the differing daily demands of lower-ranking and higher-ranking individuals in the Japanese workplace, it is reasonable to theorize that telework would not be equally prevalent across different ranks (Iwashita, 2021). Indeed, initial research showed that employees in lower-ranking positions, such as non-standard (vs. full-time standard) employees and non-managers (vs. managers), were less likely to telework compared to managers (Ono, 2022).

Several factors influencing teleworking levels in Japan have already been identified, including people's location of residence, occupation, gender, education, age, income, employment status, and company size (Okubo, 2022; Ono, 2022; Ono and Mori, 2021). However, most of these studies have focused on the individual or organizational factors associated with the implementation of telework. Thus, what is currently missing is a clear empirical understanding of the social institutional factors, psychological and behavioral factors, and culturally constructed individual factors that could affect the uptake of telework.

Consequences of telework. Considering that telework could disrupt Japanese working and management styles, it is conceivable that it might also affect social relationships and, consequently, employees' well-being. There are also valid reasons to believe that telework could result in different psychological outcomes for non-managers and managers. Indeed, a recent review highlighted important psychological differences between higher-ranking (e.g., managers) and lower-ranking (e.g., non-managers) individuals (Gobel and Miyamoto, 2023). For example, managers in East Asian countries, such as Japan, are expected to be oriented towards both performance and interpersonal relationships (Javidan et al., 2006). This aligns with the Performance-Maintenance Theory of leadership (Misumi and Peterson, 1985), which suggests that effective leaders in the Japanese cultural context are perceived to excel in both performance functions, focusing on reaching group goals, and maintenance functions, focusing on maintaining the social stability of the group. These cultural differences in leadership expectations are also reflected in the level of responsibility leaders are expected to assume when things go wrong in the organization. For example, in Japan, compared to the U.S., managers are more likely to be blamed for organizational failures, even when not directly involved (Zemba et al., 2006), and Japanese managers also assume more responsibility for organizational failure (Maddux and Yuki, 2006).

Initial research investigating the socio-psychological effects of teleworking on employees' well-being during the pandemic provides some support for this idea. Notably, many institutions in Japan conducted surveys during the pandemic to inquire about how people coped with the various changes in their daily lives. Some surveys found that telework made employees feel more isolated and stressed. For example, surveys conducted in April 2020 and October 2021 showed that 25–30% of Japanese employees felt less connected to their colleagues or managers (Recruit Works Institute, 2021), compared to before the pandemic (Enatsu et al., 2020). In another survey conducted in September 2020, 56.9% of employees who started teleworking after the outbreak of the COVID-19 pandemic reported

experiencing stress that they did not have before starting to telework (Recruit Career, 2021).

Other studies, however, provided a more nuanced picture, indicating that the psychological impacts of telework depended on both individual characteristics and the stage of the pandemic. For example, Hayashi (2021) found that as of March 2020, more than half of the Japanese employees (51.5%) felt some hindrance in their work because of teleworking. This percentage increased to a peak of 59.4% in May 2020 but subsequently declined to 46.5% in July 2020 and finally to 42.9% in December 2020. Conversely, the percentage of those who reported having “no obstacles at all” when teleworking gradually increased, rising to 21.2% in December 2020. Importantly, in this study, only a minority of Japanese employees perceived significant downsides to teleworking. Specifically, only 32% of the Japanese respondents believed that teleworking intensified job insecurity and stress, only 25% reported feeling pressured to come to the office when colleagues were doing so, and only 18% said they felt guilty about teleworking (Hayashi, 2021). In line with this research, the Persol Research Institute (2022) found that 80.9% of employees working in Japanese companies wanted to continue teleworking in the future.

In these previous studies, the causal relationship of telework and its consequences could not be empirically tested, as they mostly relied on cross-sectional data based on respondents' subjective evaluations. We aim to fill this gap by reporting the results of a natural experiment.

Current study. The current study examined the antecedents and the consequences of telework using a unique longitudinal panel survey that focused on the factors related to the implementation of telework in Japan (Figs 1 and 2). Below, we define these factors as socio-psychological factors because they are social (i.e., at the institution and interaction levels) and psychological (i.e., at the individual level) in nature.

Before the pandemic, without knowing the pandemic would happen, we initiated a comprehensive survey on the work styles, well-being, and mental health of Japanese middle managers (and non-managers). We continued this survey as a longitudinal study during the pandemic, treating it as a natural experiment. The longitudinal nature of the data allowed us to investigate the temporal changes in socio-psychological factors among Japanese employees throughout the pandemic. While a cross-cultural comparison could test the above-discussed culture-specific factors in Japan, our within-Japan natural experiment offers a unique opportunity to examine the causal impact of institutional and cultural factors associated with telework in Japan. The employment and remuneration systems are key factors in determining the Japanese working styles, management styles, communication styles, and employees' psychology and behavior. Importantly, Japanese organizations have undergone a gradual shift in employment and remuneration systems over the last decades, moving from a seniority-based remuneration system to a more performance-based system (Ogihara, 2017). Some organizations have adopted less traditional systems, while others have retained more traditional ones. Thus, we expected meaningful variations in employment and remuneration systems and consequential variations in the downstream effects of telework, even within Japan.

We conducted three waves of data collection in February 2020 (Wave 1), February 2021 (Wave 2), and March 2022 (Wave 3; Fig. 1). All three surveys addressed the psychological tendencies of the participants and the institutional and cultural characteristics of the companies they work for. In addition, in Wave 2 and Wave 3, we also inquired about individual and corporate

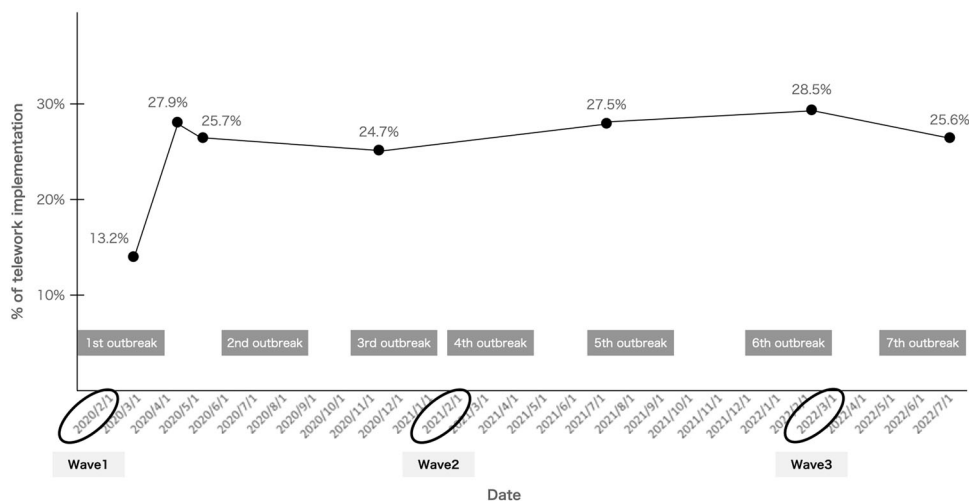


Fig. 1 Trend in the rate of telework implementation in Japanese companies (modified from Persol Research Institute (2022)).

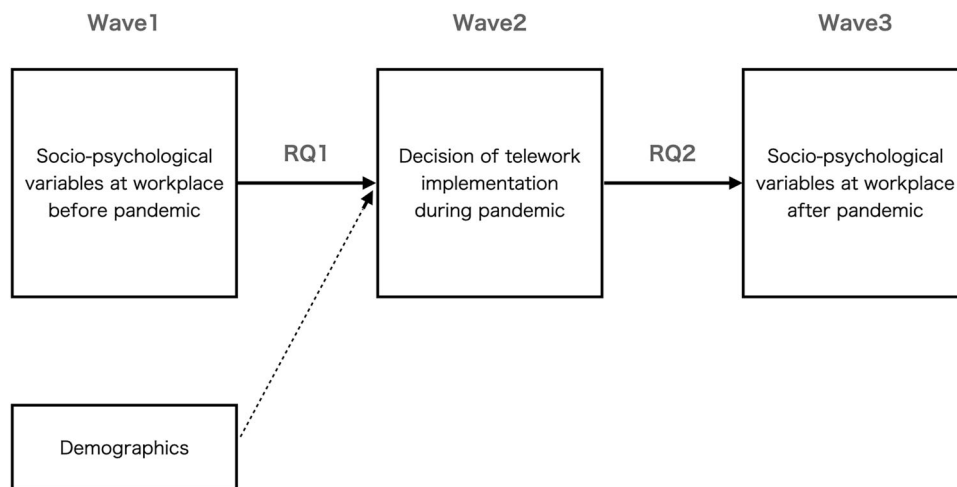


Fig. 2 How we operationalized research questions during each wave of the survey.

measures taken against the pandemic. We wanted to answer two research questions by analyzing the three waves of this survey (Fig. 2):

RQ1: What socio-psychological factors in the Japanese workplaces were important for implementing telework in the first place?

RQ2: How did the implementation of telework subsequently influence socio-psychological factors in these workplaces?

Overview of the measures. To address these research questions, we used several measures from a 3-wave longitudinal survey. Since the survey was not exclusively designed for testing these research questions, not all survey items directly relate to the theoretical constructs discussed above. Table 1 provides a summary of relevant constructs and how they were measured. Based on the above literature review, we generated 14 related concepts in our analysis.

Remuneration system: We assessed both seniority-based and meritocratic remuneration systems in Japanese workplaces.

Employees’ psychological and behavioral tendency to monitor others in the workplace: This construct included two measures: *social vigilance* (monitoring others in relation to the self;

Yamagishi and Yamagishi, 1994) and *concern for intragroup relationships* (monitoring relationships of others in the ingroup; Takemura et al., 2004).

Communication style in the workplace: This construct was measured using the *independence* and *interdependence scales* (Hashimoto and Yamagishi, 2016; Park and Kitayama, 2014).

Organizational culture of the workplace: This construct included a measure of perceived *clan culture* (Cameron and Quinn, 2011) assessing the harmony orientation of social relationships, and *market culture* (Cameron and Quinn, 2011) assessing the performance (versus process) orientation of the workplace.

Hierarchy: We measured three variables to cover different aspects of hierarchy: *Perceived hierarchy mutability* measured the perceived strength of the hierarchy within the organization (Hays and Bendersky, 2015). *Employees’ sense of power* is measured by the subjective status of the employee within the organization (Anderson et al., 2012; Okada et al., 2012). We also measured *employees’ sense of responsibility* (Scholl et al., 2018). We further explored the relationships between telework and managership by using balanced data collected from both managers and non-managers.

Table 1 Socio-psychological variables.

Concepts	Questions	# of items	Alpha or correlation	Mean and standard deviation
Seniority system	-In my workplace, salary, and promotion are usually decided based on age or seniority of employment. (7-point Likert Scale) (Created by the authors)	1		mean(Wave1) = 3.93 SD(Wave1) = 1.65 mean(Wave2) = 3.97 SD(Wave2) = 1.64 mean(Wave3) = 3.90 SD(Wave3) = 1.63
Meritocracy system	-In my workplace, salary, and promotion are usually decided based on individual ability and performance. (7-point Likert Scale) (Created by the authors)	1		mean(Wave1) = 4.16 SD(Wave1) = 1.58 mean(Wave2) = 4.16 SD(Wave2) = 1.46 mean(Wave3) = 4.28 SD(Wave3) = 1.48
Social vigilance	-In my workplace, one does not need to be constantly afraid of being cheated. -In my workplace, one has to be alert or someone is likely to take advantage of you. (reverse coded) (5-point Likert Scale) (Modified to workplace setting from Yamagishi and Yamagishi, 1994)	2	r(Wave1) = 0.55, r(Wave2) = 0.63, r(Wave3) = 0.63	mean(Wave1) = 2.82 SD(Wave1) = 1.03 mean(Wave2) = 2.72 SD(Wave2) = 1.03 mean(Wave3) = 2.73 SD(Wave3) = 1.03
Concern for intragroup relationship	-It is important to me that I know which of the members in my workplace are friends with each other and/or which members don't like each other. -I often think about whether the members in my workplace are getting along with each other. (5-point Likert Scale) (Takemura et al., 2004)	2	r(Wave1) = 0.43, r(Wave2) = 0.35, r(Wave3) = 0.31	mean(Wave1) = 3.27 SD(Wave1) = 0.89 mean(Wave2) = 3.22 SD(Wave2) = 0.84 mean(Wave3) = 3.22 SD(Wave3) = 0.80
Independent social orientation	Wave1 & Wave2 (Self-expression) -I prefer to be direct and forthright when I talk with people. -I always make my position clear. (5-point Likert Scale) (Hashimoto and Yamagishi, 2016)	2	r(Wave1) = 0.61, r(Wave2) = 0.64	mean(Wave1) = 3.00 SD(Wave1) = 0.91 mean(Wave2) = 3.00 SD(Wave2) = 0.94
	Wave3 I always try to have my own opinions in my workplace. I am comfortable with being singled out for praise or rewards in my workplace. ... (5-point Likert Scale) (Park and Kitayama, 2014)	10	α (Wave3) = 0.83	mean(Wave3) = 3.16 SD(Wave3) = 0.63
Interdependent social orientation	Wave1 & Wave2 (Rejection avoidance) -I find myself feeling anxious if people are watching me. -I find myself being concerned about what others think of me. (5-point Likert Scale) (Hashimoto and Yamagishi, 2016)	2	r(Wave1) = 0.91, r(Wave2) = 0.86	mean(Wave1) = 3.31 SD(Wave1) = 1.15 mean(Wave2) = 3.25 SD(Wave2) = 1.15
	Wave3 I am concerned about what people in my workplace think of me. In my own personal relationships in my workplace, I am concerned about the other person's status compared to me and the nature of our relationship. ... (5-point Likert Scale) (Park and Kitayama, 2014)	10	α (Wave3) = 0.83	mean(Wave3) = 3.33 SD(Wave3) = 0.55
Clan culture	Wave1 & Wave2 -My organization is a very personal place. It is like an extended family. People seem to share a lot of themselves.	1		mean(Wave1) = 4.05 SD(Wave1) = 2.12 mean(Wave2) = 4.03 SD(Wave2) = 2.04

Table 1 (continued)

Concepts	Questions	# of items	Alpha or correlation	Mean and standard deviation
	(9-point Likert Scale) (Cameron and Quinn, 2011) Wave3 -My organization is a very personal place. It is like an extended family. People seem to share a lot of themselves. -The leadership in the organization is generally considered to exemplify mentoring, facilitating, or nurturing. ...	6	$\alpha(\text{Wave3}) = 0.94$	mean(Wave3) = 4.58 SD(Wave3) = 1.67
Market culture	(9-point Likert Scale) (Cameron and Quinn, 2011) Wave1 & Wave2 -My organization is very production orientated. A major concern is with getting the job done, without much personal involvement.	1		mean(Wave1) = 4.54 SD(Wave1) = 2.09 mean(Wave2) = 4.62 SD(Wave2) = 2.08
	(9-point Likert Scale) (Cameron and Quinn, 2011) Wave3 -My organization is very production orientated. A major concern is with getting the job done, without much personal involvement. -The leadership in the organization is generally considered to exemplify an aggressive, results-oriented, no-nonsense focus. ...	6	$\alpha(\text{Wave3}) = 0.91$	mean(Wave3) = 4.77 SD(Wave3) = 1.51
Hierarchy mutability	(9-point Likert Scale) (Cameron and Quinn, 2011) -People's relative positions in the formal hierarchy can be altered. -The formal hierarchy is fixed and would be extremely difficult or impossible to change. (reverse coded) (7-point Likert Scale) (Hays and Bendersky, 2015)	2	$r(\text{Wave1}) = 0.35,$ $r(\text{Wave2}) = 0.33,$ $r(\text{Wave3}) = 0.29$	mean(Wave1) = 3.87 SD(Wave1) = 1.22 mean(Wave2) = 3.85 SD(Wave2) = 1.21 mean(Wave3) = 3.98 SD(Wave3) = 1.63
Sense of power	-I think I have a great deal of power. -My ideas and opinions are often ignored. (Reverse coded) (7-point Likert Scale) (Anderson et al., 2012)	2	$r(\text{Wave1}) = 0.39,$ $r(\text{Wave2}) = 0.41,$ $r(\text{Wave3}) = 0.41$	mean(Wave1) = 4.28 SD(Wave1) = 1.22 mean(Wave2) = 4.35 SD(Wave2) = 1.19 mean(Wave3) = 4.42 SD(Wave3) = 1.19
Perceived responsibility	-I am responsible for achieving important goals. -I am aware that others depended on me. (5-point Likert Scale) (Scholl et al., 2018)	2	$r(\text{Wave1}) = 0.56,$ $r(\text{Wave2}) = 0.61,$ $r(\text{Wave3}) = 0.55$	mean(Wave1) = 3.16 SD(Wave1) = 0.96 mean(Wave2) = 3.21 SD(Wave2) = 0.94 mean(Wave3) = 3.40 SD(Wave3) = 0.89
Organizational commitment/affective commitment	-I feel emotionally attached to my organization. -I was taught to believe in the value of remaining loyal to one organization. (5-point Likert Scale) (Allen and Meyer, 1990)	2	$r(\text{Wave1}) = 0.50,$ $r(\text{Wave2}) = 0.48,$ $r(\text{Wave3}) = 0.31$	mean(Wave1) = 2.84 SD(Wave1) = 0.98 mean(Wave2) = 2.93 SD(Wave2) = 0.94 mean(Wave3) = 2.92 SD(Wave3) = 0.94
Social isolation	-In my workplace, I feel isolated from others. (5-point Likert Scale) (Modified to a workplace setting from Igarashi, 2019)	1		mean(Wave1) = 2.57 SD(Wave1) = 1.14 mean(Wave2) = 2.50 SD(Wave2) = 1.13 mean(Wave3) = 2.57 SD(Wave3) = 1.13
Superior-subordinate disintegration	-I feel caught in the middle of the expectations of my superiors and one of my subordinates. (5-point Likert Scale) (Created by the authors)	1		mean(Wave1) = 2.67 SD(Wave1) = 1.17 mean(Wave2) = 2.70 SD(Wave2) = 1.17 mean(Wave3) = 2.73 SD(Wave3) = 1.13

Quality of social relationships: This construct included three measures: *Employees' organizational/affective commitment* (Meyer and Allen, 1991) to assess employees' relationship with their organization, *employees' social isolation* (modified from Igarashi, 2019) to assess employees' relationship with colleagues in the workplace, and the *disintegration between supervisor-subordinate* to assess the relationship between superiors and subordinates.

For more detailed information about how these concepts were operationalized, please refer to Table 1. Due to the survey's primary focus on various aspects of Japanese employees' working styles and length limitations, we included only one or two items for each concept. However, in Wave 3, we were able to include full-scale measures for the variables of interdependence, independence, clan culture, and market culture. All variables at the institution, interaction, and individual levels were measured by asking individual participants, making these levels *perceptions* of institutions and interactions provided by each participant.

Hypotheses. Using these variables, we tested the following overall hypotheses:

H1: Due to the incompatibility of traditional Japanese culture with telework (and/or its perception by the decision-makers), telework is less likely to be implemented in organizations with a more traditional Japanese culture.

H2: Because traditional Japanese culture is (and/or is perceived to be) incompatible with telework, the implementation of telework will cause more disruption for workplaces with more traditional Japanese culture.

Among the tested variables, the seniority system, social vigilance, concern for intragroup relationships, interdependence, and clan culture constitute *more* traditional Japanese culture and are hypothesized to have *negative* relationships with telework, both as antecedents and consequences. Conversely, the meritocracy system, independence, market culture, and hierarchy mutability constitute *less* traditional Japanese culture and are hypothesized to have *positive* relationships with telework, both as antecedents and consequences.

The effect of telework on the quality of social relationships, including the sense of power and responsibility, did not have a priori hypothesis since the empirical results are mixed.

Timing of the data collection. The National Institute of Infectious Diseases (2020) reported that the first diagnosis of COVID-19 in Tokyo occurred on January 23, 2020, and the number of cases remained between 0 and 10 per day until the end of March 2020. Wave 1 was conducted in February 2020, representing the period before the pandemic (Fig. 1). The first state of emergency was declared on April 7, initially for seven prefectures. During the state of emergency, Japanese companies were requested to adjust to the situation, such as through the implementation of telework.

After the end of the first state of emergency, several more were subsequently declared, and as the Japanese government lifted each state of emergency, some companies decided to cautiously bring their employees back to their offices, while others continued to encourage teleworking (Persol Research Institute, 2022). This suggests that at the time when we conducted Wave 2 of the survey in February 2021, companies were able to more freely choose whether to implement/continue telework or not, and teleworking had become the "new normal" rather than an emergency measure against the pandemic (Fig. 1). Examining how socio-psychological variables at workplaces in Wave 1 affected telework situations in companies in Wave 2 enables us to investigate RQ1: What socio-psychological factors in Japanese workplaces were important for implementing telework in the first place?

We conducted the data collection for Wave 3 one year after Wave 2 (Fig. 1). During this period, the percentage of telework in Japan stabilized at around 25% (Persol Research Institute, 2022). Analyzing how companies with implemented telework at the time of Wave 2 affected socio-psychological variables at workplaces at the time of Wave 3 enables us to investigate RQ2: How did the implementation of telework influence socio-psychological factors in these workplaces?

Methods

Participants. Participants in our natural experiment were employees working for Japanese companies. They were recruited through a research company. Three waves of online surveys were conducted, with the same participants being invited to respond to all three waves. Wave 1 took place in February 2020, before the COVID-19 pandemic in Japan. Wave 2 took place in February 2021, and Wave 3 in February 2022, both during the pandemic.

In Wave 1, we recruited a quota-based stratified sample of 1248 participants, balanced in terms of gender (50% male and 50% female), age range (33.3% in 30 s, 33.3% in 40 s, and 33.3% in 50 s), and organizational rank (33.7% section head or assistant manager level, 33.7% unit head or supervisor level, and 32.7% staff [not in management positions]). Wave 2 received responses from 936 participants (75% of the first wave), and Wave 3 received responses from 633 participants (68% of the second wave). Of these, 71 individuals reported that they had moved organizations between the surveys and were therefore excluded from the analysis. Additionally, we also excluded those respondents who did not pass the two attention checks in each wave. Thus, our final sample consisted of 367 individuals¹ (184 males and 183 females). Although the attrition rate from the first survey varied by age and position, there were almost equal numbers of participants for every age group and position in both Wave 2 and Wave 3.

Measures. Participants responded to surveys in Japanese, providing insights into their psychological tendencies and the perceived institutional and cultural characteristics of their companies in each wave. In Wave 2 and Wave 3, we also asked about the measures that individuals and companies were taking against COVID-19. Here, we focus on the subset of these measures relevant to testing the hypotheses of this study.

Socio-psychological variables in Japanese companies. Information about the socio-psychological variables can be found in Table 1, with theoretical background explanations available in the introduction's "Overview of the Measures". Correlation tables for socio-psychological variables for each wave can be found in the supplementary material.

Telework measures. Participants rated the extent to which they themselves and their companies implemented work-related measures against COVID-19 compared to the pre-pandemic situation (on an 11-point scale from 0% to 100%, going up in 10% intervals). Among these measures, the level of telework in the workplace was assessed with the question: "To what extent do people in your workplace, overall, work from home or telework compared to before the outbreak of COVID-19?". As Wave 1 did not include a question about telework, Wave 3 included the following question "Please think about two years ago (February 2020). To what extent did people in your workplace, overall, work from home or telework at that time?". We used the answers to this question to represent the amount of telework at the time of Wave 1.

These telework variables were treated as binary variables (0% for those who did not telework at all vs. 10–100% for those who did telework to some extent) because the distribution was skewed.

The percentage of participants engaging in telework changed from 35.0% (Wave 1), to 51.7% (Wave 2), to 53.1% (Wave 3). The correlation between the telework rate in Wave 1 and Wave 2 was 0.53, and between Wave 2 and Wave 3 was 0.80. Thus, levels of telework remained stable between Wave 2 and Wave 3 in our data.

Demographic measures. Finally, we collected demographic information, including employees' sex, age, location of residence, work industry, job type (such as sales, research, and development, etc.), work position, and company size, as well as whether important clients were domestic or overseas.

Analysis strategy. We used socio-psychological variables to assess the state of participants' companies before the pandemic and after telework implementation (or non-implementation). Our analyses aimed to uncover how the socio-psychological characteristics of companies before the pandemic influenced their decisions to implement (or not) telework (RQ1), and subsequently, how this decision impacted the companies (RQ2).

The analysis strategy involved logistic regression analyses to answer RQ1 and linear regression analyses to answer RQ2. To answer RQ1, logistic regressions were performed with socio-psychological variables related to company culture at Wave 1 as independent variables, representing participants' perceptions of their company's organizational culture before the pandemic. The dependent variable was the presence or absence of telework in Wave 2. Fourteen separate logistic regressions were conducted with each socio-psychological variable as a predictor, controlling for demographics and telework implementation in Wave 1. We also estimated a base model that only included the control variables. For each model, we report the increase in fit from the base model (Δ deviance) as well as the regression coefficient for each predictor variable.

To answer RQ2, we conducted linear regression analyses with presence or absence of telework at Wave 2 as the independent variable and socio-psychological variables related to company culture at Wave 3 as dependent variables, representing participants' perceptions of their company's state after implementing (vs. not implementing) telework. Fourteen socio-psychological factors were analyzed separately, controlling for the corresponding social-psychological variable in the previous wave (Wave 2), demographics, and meritocracy system in Wave 1. We also estimated a base model that only included the control variables. For each model, we report overall fit (R^2) and the increase in fit from the base model (ΔR^2) as well as the regression coefficient for each predictor variable.

In both analyses, demographics were controlled for because past research showed that demographic factors, such as where people live, their employment status, their occupation, and the size of the company where they work, can affect telework implementation (Ono, 2022). Demographic variables from Wave 1 were aggregated into one composite telework probability variable by conducting logistic Lasso regression (Tibshirani, 2011). The binary telework variable was regressed onto all demographic variables and the predicted logit (with the sign inverted) was used to control for the effect of demographics on telework in Analysis 1 and the predicted probability was used as the propensity score for Analysis 2. The lambda parameter for the regularization term was determined using cross-validation within the entire data set, and the final regression analyses estimated telework probability from the entire data set with the best lambda. The coefficients for each demographic variable are reported in Supplementary Information Table S1.

In addition, since the implementation of telework was not random, it was necessary to examine the impact of the

implementation of telework on socio-psychological variables beyond differences in demographics. For this reason, Analysis 2 used an inverse probability weighting method with propensity scores that were computed using demographic variables from Wave 1. We also controlled for the socio-psychological variables in Wave 1 which were significant in Analysis 1.

As exploratory follow-up analyses, we tested the main effect and moderation effect of managership (i.e., managers vs. non-managers). Since our primary purpose is not to test the effect of managership, we only report the results that deviate from the main analyses.

Results

What socio-psychological factors in Japanese workplaces were important for introducing telework in the first place? The base model showed a good fit ($df=296$, $AIC=228.5$, $deviance=222.50$, $\Delta deviance$ from null model = 191.25, $p < 0.001$). We found that in the base model, telework at the time of Wave 2 was significantly predicted by telework at the time of Wave 1 ($z=5.038$, $p < 0.001$), and the composite demographic measure at the time of Wave 1 ($z=7.761$, $p < 0.001$).

The results of Analysis 1 are shown in Table 2. Among all the socio-psychological variables that we tested, only the meritocracy system variable at the time of Wave 1 significantly predicted the implementation of telework at the time of Wave 2 ($B=0.232$, $z=1.976$, $p=0.048$). This indicates that telework was somewhat more likely to be introduced in companies that had adopted a meritocracy system even prior to the pandemic.

Follow-up analyses tested whether these results were robust when managership was controlled for, and whether they differed between managers and non-managers. The effect of the meritocracy system was reduced to being marginally significant ($z=1.957$, $p=0.050$) when managership and the managership by meritocracy interaction were controlled for. However, the size of this reduction in the effect of meritocracy was very small (i.e., $\Delta z=0.019$). Thus, it can be attributed to random fluctuation when adding two more variables to the model, though it indicates that the meritocracy effect may need to be interpreted with caution. None of the other results changed, and managership did not moderate any of the other effects.

How did the implementation of telework influence socio-psychological factors in Japanese workplaces? The results of Analysis 2 are shown in Table 3. All models showed a good fit ($df=296$, $R^2s > 0.156$, $ps < 0.001$). We found that telework at the time of Wave 2 predicted higher independence ($B=0.162$, $t=2.332$, $p=0.020$), higher hierarchy mutability ($B=0.245$, $t=2.074$, $p=0.039$), and higher organizational commitment ($B=0.178$, $t=2.058$, $p=0.041$) at the time of Wave 3.

Follow-up analyses tested whether these results were robust when managership was controlled for, and whether they differed between managers and non-managers. The telework effect on independent social orientation was robust ($t=2.133$, $p=0.034$), and so was its effect on organizational commitment ($t=2.097$, $p=0.037$). The effect on hierarchy mutability, however, was reduced to being marginally significant ($t=1.933$, $p=0.054$) when managership and its interaction with the target socio-psychological variable were controlled for. In addition, the telework effect on social isolation became significant in the direction that telework *decreased* social isolation ($t=-2.227$, $p=0.027$). No other significant effects of telework were observed in the follow-up analyses.

The following effects were moderated by managership: We uncovered that the effect of telework on the meritocracy of the company differed between managers and non-managers

Table 2 Logistic regression models predicting teleworking implementation (Wave 2) using social-psychological variables (Wave 1).

Independent variables in Wave 1	B	SE	z-value	p-value	Δ deviance
Seniority system	-0.102	0.107	-0.948	0.343	0.902
Meritocracy system	0.232	0.118	1.976	0.048*	4.016
Social vigilance	-0.229	0.166	-1.379	0.168	1.937
Concern for ingroup relationships	-0.217	0.189	-1.146	0.252	1.324
Independent social orientation	-0.022	0.174	-0.125	0.901	0.016
Interdependent social orientation	0.025	0.147	0.171	0.865	0.029
Clan culture	0.08	0.079	1.024	0.306	1.056
Market culture	0.005	0.081	0.062	0.951	0.004
Hierarchy mutability	0.151	0.143	1.057	0.291	1.122
Sense of power	0.015	0.133	0.114	0.909	0.013
Perceived responsibility	-0.017	0.173	-0.098	0.922	0.01
Organizational commitment	-0.248	0.174	-1.425	0.154	2.073
Social isolation	0.101	0.146	0.69	0.49	0.478
Superior-subordinate disintegration	-0.224	0.146	-1.54	0.124	2.417

The coefficients of the covariates are omitted in the table. Significant results are indicated in bold.
 * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

Table 3 Linear regression models predicting social-psychological variables (Wave 3) using telework implementation (Wave 2).

Independent variables in Wave 2	Seniority system						Meritocracy system											
	B	SE	t-value	p-value	ΔR ²	R ²	B	SE	t-value	p-value	ΔR ²	R ²						
Telework	-0.073	0.163	-0.446	0.656	0.001	0.215	-0.008	0.137	-0.061	0.951	0	0.304						
Socio-psychological variables	0.451	0.054	8.409	<0.001			0.369	0.057	6.454	<0.001								
Independent variables in Wave 2	Independent social orientation						Interdependent social orientation											
	B	SE	t-value	p-value	ΔR ²	R ²	B	SE	t-value	p-value	ΔR ²	R ²						
Telework	0.162	0.069	2.332	0.02	0.015	0.162	-0.041	0.058	-0.701	0.484	0.001	0.157						
Socio-psychological variables	0.252	0.037	6.892	<0.001			0.181	0.025	7.23	<0.001								
Independent variables in Wave 2	Hierarchy mutability						Sense of power						Perceived responsibility					
	B	SE	t-value	p-value	ΔR ²	R ²	B	SE	t-value	p-value	ΔR ²	R ²	B	SE	t-value	p-value	ΔR ²	R ²
Telework	0.245	0.118	2.074	0.039	0.012	0.198	0.155	0.104	1.494	0.136	0.004	0.452	0.102	0.077	1.323	0.187	0.004	0.399
Socio-psychological variables	0.395	0.054	7.365	<0.001			0.667	0.045	14.969	<0.001			0.552	0.042	13.121	<0.001		
Independent variables in Wave 2	Organizational commitment						Social isolation						Superior-subordinate disintegration					
	B	SE	t-value	p-value	ΔR ²	R ²	B	SE	t-value	p-value	ΔR ²	R ²	B	SE	t-value	p-value	ΔR ²	R ²
Telework	0.178	0.087	2.058	0.041	0.009	0.348	-0.198	0.108	-1.834	0.068	0.008	0.341	-0.192	0.108	-1.772	0.077	0.007	0.306
Socio-psychological variables	0.564	0.047	11.948	<0.001			0.559	0.048	11.724	<0.001			0.502	0.045	11.04	<0.001		

The coefficients of demographics and meritocracy are omitted in the table. Significant results are indicated in bold.

($t = -2.266$, $p = 0.024$). Separate analyses for managers and non-managers indicated that telework did not change the meritocracy perceptions among managers ($t = -1.511$, $p = 0.132$), whereas it marginally increased the meritocracy perceptions among non-managers ($t = 1.724$, $p = 0.088$). Similarly, the effect of telework on concerns for ingroup relationships differed between managers and non-managers ($t = 2.338$, $p = 0.020$). Separate analyses for managers and non-managers indicated that telework had little effect on concerns for ingroup relationships among managers ($t = 0.962$, $p = 0.337$), whereas it decreased concerns for ingroup relationships among non-managers ($t = -2.033$, $p = .045$). Finally, the effect of telework on the sense of power also differed between managers and non-managers ($t = 2.082$, $p = 0.038$). Separate analyses for managers and non-managers

indicated that telework increased the sense of power among managers ($t = 2.743$, $p = 0.007$), whereas it had little effect on the sense of power among non-managers ($t = -1.116$, $p = 0.268$).

Discussion

The current study examined the relationships between telework and various socio-psychological factors to advance our understanding of telework implementation in Japan during the COVID-19 pandemic. We investigated two research questions (Fig. 2): (1) What socio-psychological factors in Japanese workplaces were important for introducing telework in the first place?, and (2) How did the implementation of telework subsequently influence socio-psychological factors in these workplaces? We examined these research questions using a

natural experiment, comparing employees' responses across three waves of surveys collected before and during the COVID-19 pandemic.

Influence of socio-psychological variables on telework implementation. Our primary focus was to examine the socio-psychological factors in Japanese workplaces that played a pivotal role in the implementation of telework during the COVID-19 pandemic. We hypothesized that due to the perceived incompatibility of traditional Japanese culture with telework, telework would be less likely to be implemented in organizations with a more traditional Japanese culture (H1).

This hypothesis received partial support. Results showed that the presence of meritocracy systems in Japanese workplaces at the time of Wave 1 significantly predicted telework implementation at the time of Wave 2. This finding implies that companies with existing meritocracy systems prior to the pandemic were more likely to adopt telework. As we argued in the introduction, life-long employment and seniority-based systems in Japan are the social institutional factors that can discourage telework implementation (Iwashita, 2021; Ono, 2022). These systems foster mutual monitoring of commitment, micro-management, and process-oriented evaluation. If telework physically separates employees from each other, employees cannot monitor each other's commitment and/or commitment signals as when they work together in the office. However, once an organization transitions toward a merit-based system, as has frequently happened in Japanese organizations over the last three decades (Ogihara, 2017), the criteria for employee evaluation become more transparent (although see Uchida et al., 2022).

In merit-based systems, managers can focus on evaluating the output of employees, potentially reducing the need for frequent monitoring of commitment and/or commitment signals among employees. This explains why the meritocracy system might be more compatible with telework. On the contrary, organizations without a robust meritocratic system might hesitate to embrace telework, possibly anticipating disruptive effects on the existing working and management style. Despite these insights, none of the other socio-psychological variables showed detectable effects on telework implementation, remaining ambiguous in terms of confirming and disconfirming H1.

Consequences of telework on employees' socio-psychological experiences. The present study also tested, as per H2, whether the implementation of telework disrupted the traditional Japanese culture in organizations and instead enhanced less traditional Japanese culture. The overall pattern of results was mostly supportive of H2. We found that telework implementation during the pandemic predicted greater levels of independence, hierarchy mutability, and organizational commitment, but lower levels of social isolation, one year later. An exploratory analysis provided additional insights into the socio-psychological effects on managers and non-managers. First, telework increased the workplace meritocracy among non-managers and reduced their concerns about ingroup relationships. Second, telework increased the sense of power of managers. These results suggest that telework created a new and less traditional pattern of work styles and social orientations in Japanese workplaces (i.e., independence, hierarchy mutability, meritocracy, and less concern for workplace relationships). Importantly, we did not find any measurable negative effects of implementing telework in Japanese companies during the pandemic. Instead, our results highlight its positive effects in the form of increased organizational commitment, reduced social isolation, and a greater sense of power. In what follows, we provide detailed discussions of each effect, respectively.

First, our results suggest that establishing telework can increase employees' independence, while it does not change employees' interdependence. Telework makes employees physically distant from each other, thereby focusing more on their own ideas and responsibility for each person's work. In this way, telework can lead to higher independence among Japanese employees. Importantly, telework did not decrease interdependence in our sample. One possible explanation is that even when being physically separated from each other, Japanese employees still felt connected and maintained a sense of belonging to their companies. Thus, our findings suggest that physical closeness may not be essential for maintaining interdependence. It is possible that interdependent ways of communication have become a strong habit for the Japanese, which can still be supported by new communication technologies. Similarly, interdependence may be more robust than previously thought and resilient to changes within institutions, such as the implementation of telework. On the contrary, independence is relatively new to Japanese culture, therefore there is potential for it to be changed within institutions.

Second, we found that establishing telework can increase hierarchy mutability. It is possible that the skills required when working vary between working in the office and teleworking. For example, in the Japanese context, informal communication, which usually occurs in-person at the office or through after-work drinking parties (*nomikai*), is very important, especially for gathering important information. This kind of crucial in-person communication could be disrupted by teleworking. Telework also requires acquiring new skills to handle telework-related devices and information technologies. This change in required skills might alter workplace hierarchy itself and might be reflected in an increase in hierarchy mutability, shifting away from more traditional status- and seniority-based hierarchy.

Third, the meritocracy of the company among non-managers was increased by telework. It is possible that telework motivated the organization to introduce meritocracy because it fits well with telework. This could suggest that the two social institutions of telework and meritocracy mutually reinforce each other. Meritocracy enhanced the implementation of telework and telework, in turn, enhanced the introduction of meritocracy. Given that meritocracy systems had been introduced much more for managers (Ogihara, 2017), we speculate that there was more potential for meritocracy to be introduced among non-managers when telework forced it to happen. Moreover, telework also reduced concerns about workplace relationships among non-managers, indicating that the perceived need for mutual monitoring was disrupted by telework. Note that these items measured monitoring relationships among others, in contrast to social vigilance items that measured monitoring the relationships between self and others. Monitoring relationships among others might be relatively peripheral and might be reduced by telework, particularly for non-managers who are not responsible for monitoring and managing the entire workplace.

The overall pattern of these results suggests that telework created a new and less traditional pattern of Japanese working style and social orientations in the workplace, mostly supporting H2. This shift in working style and social orientation was not accompanied by measurable negative consequences for the quality of social relationships in the workplace. Instead, the implementation of telework had some positive effects, such as increasing employees' organizational commitment. This result is consistent with past research conducted in Western cultures. For example, a seminal meta-analysis showed that telework is associated with increases in organizational commitment (Brittany and MacDonnell, 2012). These authors argued that organizational commitment increased because the flexible work arrangements

afforded through teleworking would enhance a company's reputation among employees, which in turn could increase organizational commitment. However, Japanese samples were not included in this meta-analysis. In Japan, people tend to have lower generalized trust (Yamagishi and Yamagishi, 1994). This is reflected in elements of the typical assurance-based work style of Japanese companies, such as micro-management, encouraging close communication in the office, and process-oriented appraisal (Iwashita, 2021; Ono, 2022). We argue that the decision to implement telework in this kind of work environment and organizational culture may have served as a sign of trust rather than assurance between a company and its employees, thus increasing employees' organizational commitment.

Taken together, our results suggest that telework did not yield negative consequences for employees. Some previous research has found that telework could make employees feel isolated and stressed (Enatsu et al., 2020; Recruit Works Institute, 2021), while others show the benefits of telework (Persol Research Institute, 2022). Our findings seem to corroborate the latter findings. We argue that the results in the prior literature might have been mixed because most of the research related to telework during the pandemic was conducted from 2020 to early 2021. During that time, people might have felt isolated and stressed not because of teleworking but because of the COVID-19 pandemic itself. Since we directly compared participants' responses from before with those from during the pandemic rather than asking them to retrospectively estimate how they felt before the pandemic, our results likely reflect more reliably the effect of teleworking at the time of its measurement. In addition, Wave 3 was conducted in March 2022. By this time, even people who initially found teleworking difficult might have had enough time to adjust to it.

Strengths and limitations. The major strength of the current study lies in the use of the natural experiment created by the COVID-19 pandemic, enabling a longitudinal comparison of data collected before and during the pandemic. In contrast to much of the existing literature on telework implementation in Japan, which relies on retrospective estimations, our study captured the causal changes brought about by implementing telework during the pandemic. Thus, for the first time, we were able to measure the causal role of the social and institutional antecedents of telework and the socio-psychological consequences of introducing telework in Japanese organizational contexts.

Another strength of the current study is the comprehensive testing of a broad range of socio-psychological factors for telework, covering levels of institutions, interactions, and individuals. This approach goes beyond past research, which mostly focused on how individual-level demographic factors impacted the implementation and effects of telework in Japan, such as the location of residence, occupation, gender, education, age, income, and employment status (Okubo, 2022; Ono, 2022; Ono and Mori, 2021). A novel finding of the current study is the identification of meritocracy systems as key institutional factors for telework implementation.

However, our work is not without limitations. An important limitation of this study is the trade-off between surveying Japanese employees about various aspects of their work styles and the lengths of each measure. Due to the scarcity of research related to telework and the socio-psychological characteristics of companies in Japan, we focused on exploring various aspects of this topic, considering this study as a first step for future research. Consequently, we could only include one or two items (rather than full-scales) for each measured concept. Moreover, while we provided initial explanations for the relationships between telework and the most important socio-psychological variables,

these remain speculative, and further research is needed to empirically test the suggested mechanisms.

The measure of institutional factors, such as meritocracy systems, relied on individual employees' perceptions rather than objective measures or aggregated ratings from multiple members of each organization. These limitations arise because perceptions of institutional factors may be subject to error, and an individual's perception can deviate from a shared agreement among other members of the organization. Future research should validate the current findings by measuring institutional factors with more objective indices and with aggregated perceptions from multiple individuals.

It is also noteworthy that some companies might have initially implemented telework but then discontinued it if it did not work well for them, introducing the possibility of survival bias in our findings. Indeed, social isolation, which was also reduced by telework, might reflect the survival bias, indicating that those who could remedy social isolation through telework could continue teleworking by the time of the second wave. Further empirical research is needed to clarify the effect of telework on feelings of social isolation.

Moreover, as mentioned earlier, the operationalization of telework in the current study was binary (0% vs. 10–100%), potentially reflecting the freedom to choose teleworking rather than forced telework. It is possible that forced teleworking can have negative effects. This idea is supported by the work of Nagata and colleagues (2021), showing that high-intensity teleworking (4 or more days per week) was not associated with higher work engagement. Future research should examine how forced vs. voluntary telework affects socio-psychological variables.

Practical and theoretical implications. Our research holds significant practical implications, especially in the context of the global shift toward widespread telework accelerated by the COVID-19 pandemic. Given that telework is likely to persist as the 'new normal' in many countries, scholars have stressed the importance of understanding how employees' cultural backgrounds influence the effectiveness of telework (Adamovic, 2022; Beauregard et al., 2019). In contrast to the majority of existing research conducted with Western samples (Brittany and MacDonnell, 2012; Peters et al., 2016; Venkatesh, 2020), our study contributes to the telework literature by delineating the social institutional conditions and consequences of telework in the Japanese cultural context. The findings from our study may be applicable to other East Asian countries sharing key cultural characteristics with Japan, such as low levels of relational mobility (Thomson et al., 2018).

As telework has become the norm for many companies, our study offers guidance to managers on how to design organizational policies for effective telework implementation, creating a more comfortable work-from-home environment for employees. The data suggest that a meritocracy system is a pivotal factor in successfully implementing telework. This insight is particularly relevant for companies that have transitioned their employees back to the office following the reduction of COVID-19-related risks. If the need arises to return to telework in the future, such as during natural disasters like earthquakes or typhoons, understanding the role of meritocratic systems can inform organizational strategies.

From a theoretical perspective, our research contributes to cultural psychology by illustrating a process of cultural change (Kashima et al., 2019; Varnum and Grossmann, 2021). Culture encompasses interacting systems of ideas, institutions, interactions, and individuals that are interconnected and mutually constitutive (Hamedani and Markus, 2019). The decision to

introduce telework, made by institutions (i.e., companies), not only physically separates employees, but it may also offer flexibility and autonomy to them. Consequently, it can foster independent psychological tendencies among individual employees. This demonstrates how culture can change through the dynamic interaction of institutions and individuals.

Conclusion

In a natural experiment, we conducted a longitudinal three-wave survey during the COVID-19 pandemic to investigate the antecedents to and consequences of introducing telework in the Japanese social institutional and cultural context. Our findings revealed that telework in Japan was more likely to be introduced in organizations characterized by meritocracy. Moreover, the implementation of telework, led to the enhancement of non-traditional working and communication styles, as evidenced by increased levels of independence and hierarchy mutability increased. Notably, telework did not exhibit measurable negative effects on relationship quality in the workplace. Instead, it contributed to increased organizational commitment and decreased feelings of social isolation.

Data availability

Raw data cannot be made available because we did not receive the participants' consent to do so. However, the raw code and materials are available at https://osf.io/8yrme/?view_only=c7ac96c56fb746dabc2b4654d7c4a4ae.

Received: 1 February 2023; Accepted: 31 January 2024;

Published online: 18 March 2024

Note

- Perhaps due to a substantial number of attention check questions—two in each wave and six in total—more individuals than we expected failed the attention check. However, it is noteworthy that including those who failed the attention check in our analyses did not alter the significance of the results.

References

- Adamovic M (2022) How does employee cultural background influence the effects of telework on job stress? The roles of power distance, individualism, and beliefs about telework. *Int J Inf Manag* 62:102437
- Alexandra Beauregard T, Basile KA, Canonico E, Landers RN (2019) Telework. In: *The Cambridge handbook of technology and employee behavior*. Cambridge University Press. pp. 511–543
- Bloom N, Liang J, Roberts J, Ying ZJ (2014) Does Working from Home Work? Evidence from a Chinese Experiment. *Q J Econ* 130(1):165–218
- Allen NJ, Meyer JP (1990) The measurement and antecedents of affective, continuance and normative commitment to the organization. *J Occup Psychol* 63(1):1–18
- Anderson C, John OP, Keltner D (2012) The personal sense of power. *J Pers* 80(2):313–344
- Beauregard AT, Basile KA, Canonico E, Landers RN (2019) Telework. In: *The Cambridge handbook of technology and employee behavior*. Cambridge University Press. pp. 511–543
- Brittany HM, MacDonnell R (2012) Is telework effective for organizations? A meta-analysis of empirical research on perceptions of telework and organizational outcomes. *Manag Res Rev* 35(7):602–616
- Cameron KS, Quinn RE (2011) *Diagnosing and changing organizational culture: based on the competing values framework*. John Wiley & Sons
- Enatsu I, Kannki N, Takao Y, Hattori Y, Fumoto Y, Yatera A (2020) Shingata corona uirusu kannsenshō no ryūkō he no taiou ga, syūrōsya no shinri kōdō ni ataeru eikyō (No. 31). Recruit Works Institute. https://www.works-i.com/research/paper/discussionpaper/item/DP_0031.pdf
- Fujiwara K, Takemura K (2023) A socio-ecological context moderates the association between communication skills and friendship satisfaction: possible role of relational mobility. *Asian J Soc Psychol*. <https://doi.org/10.1111/ajsp.12579>
- Gobel MS, Miyamoto Y (2023) Self- and other-orientation in high rank: a cultural psychological approach to social hierarchy. *Pers Soc Psychol Rev* 28(1):54–80
- Hall ET (1973) *The silent language* (Anchor Books Editions ed.). Doubleday, New York

- Hamedani MYG, Markus HR (2019) Understanding culture clashes and catalyzing change: a culture cycle approach. *Front Psychol* 10(APR):700
- Hashimoto H, Yamagishi T (2016) Duality of independence and interdependence: an adaptationist perspective. *Asian J Soc Psychol* 19(4):286–297
- Hayashi H (2021) 2020 nenn no terewāku wo soukatsu suru. Nomura Research Institute. https://www.nri.com/jp/knowledge/report/1st/2021/cc/0205_1
- Hays NA, Bendersky C (2015) Not all inequality is created equal: effects of status versus power hierarchies on competition for upward mobility. *J Pers Soc Psychol* 108(6):867–882
- Hendry J (2019) *Understanding Japanese Society*. Routledge
- Igarashi T (2019) Development of the Japanese version of the three-item loneliness scale. *BMC Psychol* 7(1):20
- Iwashita H (2021) The future of remote work in Japan: Covid-19's implications for international human resource management. *Entrep Bus Econ Re* 9(4):7–18
- Javidan M, House RJ, Dorfman PW, Hanges PJ, Sully de Luque M (2006) Conceptualizing and measuring cultures and their consequences: a comparative review of GLOBE's and Hofstede's approaches. *J Int Bus Stud* 37(6):897–914
- Kashima Y, Bain PG, Perfors A (2019) The psychology of cultural dynamics: What is it, what do we know, and what is yet to be known? *Ann Rev Psychol* 70(1):499–529
- Kitayama S, Akutsu S, Uchida Y, Cole SW (2016) Work, meaning, and gene regulation: Findings from a Japanese information technology firm. *Psychoneuroendocrinology* 72:175–181
- Maddux WW, Yuki M (2006) The "Ripple Effect": cultural differences in perceptions of the consequences of events. *Pers Soc Psychol Bull* 32(5):669–683
- Markus HR, Kitayama S (1991) Culture and the self: Implications for cognition, emotion, and motivation. *Psychol Rev* 98(2):224–253
- Meyer JP, Allen NJ (1991) A three-component conceptualization of organizational commitment. *Hum Resour Manag Rev* 1(1):61–89
- Misumi J, Peterson MF (1985) The performance-maintenance (PM) theory of leadership: review of a Japanese Research Program. *Adm Sci Q* 30(2):198–223
- Mori T (2021) The Coronavirus pandemic and the increase of teleworking in eight countries -from telework to flexplace systems. https://www.nri.com/-/media/Corporate/en/Files/PDF/knowledge/report/cc/digital_economy/20210216_1.pdf?la=en&hash=26D8BCD34A127F4A569035DB282FCEA6FB3A87EF
- Nagata T, Nagata M, Ikegami K, Hino A, Tateishi S, Tsuji M, Matsuda S, Fujino Y, Mori K, CORoNaWork project (2021) Intensity of Home-based Telework and Work Engagement during The COVID-19 pandemic. *J Occup Environ Med/Am Collf Occup Environ Med* 63(11):907–912
- Nakane C (1970) *Japanese Society*. University of California Press
- Ogihara Y (2017) Temporal changes in pay-for-performance systems in Japan: a decrease in seniority systems and an increase in annual salary systems (1991–2016) [Nihon ni okeru seika shugi seido dōnyū no keizaitteki hennka]. *Stud Sci Technol* 6(2):149–158
- Okada Y, Ogihara Y, Morling B, Uchida Y (2012) Shuudanseiinnokankeisei-manzokunieikyōyokukantoeikyōyokukakusagaataerukouka [in Japanese]. Proceedings of the 53rd Conference for Japanese Society of Social Psychology 4:180
- Okubo T (2022) Telework in the spread of COVID-19. *Inf Econ Policy* 60:100987
- Ono H (2022) Telework in a land of overwork: it's not that simple or is it? *Am Behav Sci*. <https://doi.org/10.1177/00027642211066038>
- Ono H, Mori T (2021) COVID-19 and telework: an international comparison. *J Quant Descr Digit Media*, 1. <https://doi.org/10.51685/jqd.2021.004>
- Park J, Kitayama S (2014) Interdependent selves show face-induced facilitation of error processing: Cultural neuroscience of self-threat. *Soc Cogn Affect Neurosci* 9(2):201–208
- Persol Research Institute (2022) Dai 7 kai shingata korona uirusu taisaku ni yoru terewāku he no eikyō ni kannsuru tyōsai. <https://rc.persol-group.co.jp/thinktank/assets/telework-survey7.pdf>
- Peters P, Lighthart PEM, Bardoel A, Poutsma E (2016) 'Fit' for telework? Cross-cultural variance and task-control explanations in organizations' formal telework practices. *Int J Human Resour Management* 27(21):2582–2603
- Recruit Career (2021) Recruit Career (2021) Shingata Corona Uirusu Ka Ni Okeru Hataraku Kojinn No Ishiki Chosa. [Survey of Working Individuals' Attitudes in the New Coronavirus Disaster]. https://www.recruit.co.jp/newsroom/recruitecareer/news/20210122_02gis1f.pdf
- Recruit Works Institute (2021) Shokuba Ni Okeru Atsumaru Imi No Tyōsa. [Investigating the Meaning of Gathering in the Workplace. https://www.works-i.com/research/works-report/item/gettogether_research_detail_1.pdf
- San Martin A, Schug J, Maddux WW (2019) Relational mobility and cultural differences in analytic and holistic thinking. *J Pers Soc Psychol* 116(4):495–518
- Scholl A, de Wit F, Ellemers N, Fetterman AK, Sassenberg K, Scheepers D (2018) The burden of power: construing power as responsibility (rather than as opportunity) alters threat-challenge responses. *Pers Soc Psychol Bul* 44(7):1024–1038
- Takemura K, Yuki M, Maddux WW (2004) Intergroup comparison orientation versus intragroup relationship orientation: Cross-cultural comparisons of two types of collectivism between Japan and the United States. Poster session presented at the 68th Annual Meeting of the Japanese Psychological Association, Tokyo, Japan (in Japanese)

- The Economist. (2020, September 12) Is the office finished? The Economist. <https://www.economist.com/leaders/2020/09/12/is-the-office-finished>
- Thomson R, Yuki M, Talhelm T, Schug J, Kito M, Ayanian AH, Becker JC, Becker M, Chiu CY, Choi HS, Ferreira CM, Fülöp M, Gul P, Houghton-Illera AM, Joasoo M, Jong J, Kavanagh CM, Khutkyy D, Manzi C, Visserman ML (2018) Relational mobility predicts social behaviors in 39 countries and is tied to historical farming and threat. *Proc Natl Acad Sci USA* 115(29):7521–7526
- Tibshirani R (2011) Regression shrinkage and selection via the lasso: a retrospective. *J R Stat Soc Ser B Stat Methodol* 73(3):273–282
- Uchida A, Nakayama M, Uchida Y (2022) Cultural psychological processes underlying workplace remuneration in Japanese and European American contexts. *Asian J Soc Psychol*. <https://doi.org/10.1111/ajsp.12560>
- Varnum MEW, Grossmann I (2021) The psychology of cultural change: Introduction to the special issue. *Am Psychol* 76(6):833–837
- Venkatesh V (2020) Impacts of COVID-19: a research agenda to support people in their fight. *Int J Inf Manag* 55:102197
- Yamagishi T, Cook KS, Watabe M (1998) Uncertainty, trust, and commitment formation in the United States and Japan. *Am J Sociol* 104(1):165–194
- Yamagishi T, Yamagishi M (1994) Trust and commitment in the United States and Japan. *Motiv Emot* 18(2):129–166
- Zemba Y, Young MJ, Morris MW (2006) Blaming leaders for organizational accidents: proxy logic in collective- versus individual-agency cultures. *Organ Behav Humn Decis Process* 101(1):36–51

Author contributions

MN, KT, MG, and YU conceptualized the study; MN, KT, MG, and YU collected data for the study; HD and YW cleaned the data; HD and MN analyzed data; HD wrote the first draft; All authors reviewed, revised the draft, and approved of the final manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

This project received ethical approval from Kyoto University's Institutional Review Board. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

Informed consent

Informed consent was obtained from all participants prior to their participation.

Additional information

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1057/s41599-024-02770-7>.

Correspondence and requests for materials should be addressed to Hiina Domae.

Reprints and permission information is available at <http://www.nature.com/reprints>

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

© The Author(s) 2024