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RESEARCH PAPER

Recalling Positive Events at Work Makes Employees Feel Happier, Move More, but Interact Less: A 6-Week Randomized Controlled Intervention at a Japanese Workplace

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Abstract Simple self-administered activities, such as practicing gratitude or kindness, have been shown to increase happiness, yet only self-report measures have been used so far. Our study, conducted with a Japanese workplace sample, incorporated a novel technology to gather precise behavioral data reflecting participant movement and social interactions. Employees were randomly assigned to either recount three positive events at work (a positive activity) or list work tasks they completed (control) weekly for 6 weeks; furthermore, they reported their happiness levels and wore sociometric badges that recorded their behavior. Relative to controls, participants who considered good things at work not only reported relatively greater happiness over time but moved more upon arriving to work, engaged in less social interaction, and left the office earlier. Most of the findings were moderated by participant effort, such that those who put more effort into the positive activity also showed greater changes.

Keywords Happiness · Subjective well-being · Positive activities · Positive activity interventions · Sociometric data · Behavioral data

1 Introduction

People around the globe acknowledge that the pursuit of happiness, or subjective well-being, is a high-priority life goal (Diener 2000). Given the many benefits of happiness, this preoccupation is not unwarranted. Positive emotions—a core component of well-being—are associated with desirable outcomes across a number of life domains, such as work,

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relationships, and physical health (Lyubomirsky et al. 2005). Fortunately, research over the past decade has established that engaging in positive activities—for example, performing acts of kindness (Layous et al. 2012) or expressing gratitude (Emmons and McCullough 2003; Lyubomirsky et al. 2011)—can sustainably increase happiness in practitioners (see Layous and Lyubomirsky 2014; Lyubomirsky and Layous 2013, for reviews). Broadly, positive activities are simple, intentional, and regular practices meant to mimic the myriad healthy thoughts and behaviors (e.g., prosocial behavior, grateful and optimistic thinking; Lyubomirsky and Layous 2013) that happy people naturally engage in. However, the research on positive activities to date has suffered from several significant limitations. First, experimental interventions to test the efficacy and boundary conditions of positive activities are predominantly conducted in the West. Second, they neglect the workplace. Third, and perhaps most important, they fail to measure actual human behavior. Our study sought to remedy each of these shortcomings by experimentally testing a positive activity in a Japanese workplace sample and collecting behavioral data.

1.1 Expanding Outcome Variables: Sociometric and Ambulatory Behavioral Measurement

A primary aim of our study was to examine whether a specific positive activity—a grateful thinking exercise involving recalling three good things that occurred each week at work—can lead to increases in happiness over time. In addition to collecting self-reports of happiness, however, we also examined how the positive activity might change the employees' actual behavior—specifically, their physical movements and social interactions—over time. A frequent criticism leveled against social and personality psychology is that it overlooks actual behavioral variables (Baumeister et al. 2007). Psychologists often instead rely on self-report surveys, which are subject to numerous cognitive and memory biases (e.g., Kahneman et al. 2004). That behavioral variables are usually excluded from studies is testament to the difficulties and hassles associated with observing, recording, and coding participants' behavior.

Fortunately, recent technological developments, such as computer miniaturization, long-lasting batteries, and wireless communication, are facilitating a new approach to behavioral monitoring that is more robust and less laborious than traditional methods. Also, because miniaturized devices can be worn unobtrusively, researchers can monitor participants in naturalistic locations, such as schools or workplaces, rather than confining them to artificial laboratory environments. In this study, we used a custom-built ambulatory assessment device with sociometric instruments (measuring face-to-face interactions), which resembles an employee badge or name tag. Specifically, this *sociometric badge*, the Hitachi Business Microscope®, allowed us to measure levels of physical activity throughout the day, as well as amount of time spent in social interactions. The badge has been used in studies of flow, knowledge transfer, and interoffice communication (for more information about the device and corresponding research, see Yano et al. 2012). For example, researchers have found that participants' consistency in ambulatory movement correlates with the likelihood of being in a state of flow or engagement (Ara et al. 2009). Hitachi has used such data to offer feedback to employees to help them balance knowledge sharing (i.e., interacting with other employees) and knowledge creation (i.e., time alone concentrating; Sato et al. 2009; Tsuji et al. 2009).

This new technology gave us an opportunity to employ ambulatory and sociometric measurements to validate that the practice of a positive activity would not only produce changes in our participants' self-reports, but also in their actual behaviors, as well as to

explore the ways such behavioral changes would be manifested. Would individuals who regularly engage in a positive activity become more or less social, and how would their levels of physical activity shift throughout the course of the study?

1.2 Expanding the Generalizability of Positive Activities: A Japanese Workplace Sample

Despite the advances made in cross-cultural correlational well-being research (Diener and Diener 1995; Uchida et al. 2004), randomized controlled positive activity interventions still primarily rely on samples from North America and Europe (for exceptions, see Layous et al. 2013; Otake et al. 2006). This over-reliance on Western samples limits the conclusions that can be made, as one's culture may impact one's pursuit of happiness (Diener and Diener 1995; Diener and Suh 1999). Foreign-born Asian–Americans, for example, have been found to derive less benefit from expressing optimism and conveying gratitude than Anglo-Americans (Boehm et al. 2011), possibly due to cultural differences in the value ascribed to self-improvement and individual goals (Triandis 1995). In this study, we aimed to validate the efficacy of a positive activity intervention in a population residing in a non-Western, collectivist country—specifically, Japan.

Another limitation of prior research is that, to our knowledge, randomized controlled positive activity interventions (i.e., actual experiments) are not often, if ever, conducted in occupational settings, prompting organizational psychologists (e.g., Fisher 2010) to recommend that researchers conduct experiments in the workplace using well-being and occupationally-relevant variables as outcomes. Given that most employed adults spend the majority of their waking hours at work and that work is often a source of chronic stress, workplaces are an important setting in which to help individuals flourish. Indeed, growing evidence demonstrates that happiness characterizes effective, high-performing employees (see Boehm and Lyubomirsky 2008, for a review, and Piccolo et al. 2005, for studies using East Asian populations). For example, in correlational studies, happiness and positive affect predicts several work-related outcomes, such as superior performance ratings, high job satisfaction, and low absenteeism (Connolly and Viswesvaran 2000; Cropanzano and Wright 1999; Pelled and Xin 1999). Furthermore, in experimental lab studies, people induced to experience positive affect persist at difficult tasks longer (Sarason et al. 1986) and set higher goals for themselves (Baron 1990) than those induced to experience neutral affect.

Cross-cultural research on well-being in occupational settings identifies Japan as having a particularly challenging work environment (Kawakami and Haratani 1999), placing near the bottom in national rankings of job satisfaction and occupational measures such as workday hours, opportunities for advancement, performing interesting work, working independently, helping coworkers, performing work useful to society, and good relationships with colleagues (Sousa-Poza and Sousa-Poza 2000). Furthermore, the Japanese Ministry of Health, Labour, and Welfare (2009) cited over 300 deaths due to "karoshi" (death by overworking) between 2002 and 2005 (Iwasaki et al. 2006), and, in 2007, launched a work-life balance campaign to address such issues. Furthermore, the Japanese economy has been stagnating for over a decade (Kuttner and Posen 2001), and unfavorable macroeconomic conditions coincide with decrements in workers' well-being over time (in the US; Hurd and Rohwedder 2010) and increases in mortality (in the US and Japan; Veenhoven, and Hagenaars 1989). The current research was conducted at a Hitachi engineering office in Tokyo, Japan. Because Hitachi is a global powerhouse—ranked 38th in revenue on Fortune magazine's Global 500 list—the pressure for employees to achieve is presumably high (Fortune Global 500 2012). In addition, because nine out of ten

Japanese citizens live in urban environments (91.3 % urbanized; CIA, 2011), we expect employees at a major company in Tokyo to be representative of a large portion of the Japanese workforce. Although researchers have conducted workplace interventions in Japan, these have primarily been non-randomized stress-reduction programs (see Kawakami and Haratani 1999, for a review).

In sum, substantial research demonstrates that happiness has important work-related outcomes and suggests that enhancing the well-being of employees, especially in Japanese workplaces, is a worthwhile endeavor. Therefore, we sought to explore whether a positive activity tailored to the workplace could effectively raise happiness in employees.

1.3 Expanding Understanding of Key Moderators: Effort

Multiple factors have been found to affect the degree to which positive activities work to increase well-being (Layous and Lyubomirsky 2014; Lyubomirsky and Layous 2013). These factors include variety in how a positive activity is practiced, the practitioner's levels of social support, and—most relevant to the present experiment—effort. For example, one study showed that becoming happier requires both a "way" (i.e., an efficacious strategy) and a "will" (i.e., the motivation and effort to carry it through; Lyubomirsky et al. 2011). Specifically, effort mustered for an assigned activity was found to pay dividends, but only for participants who practiced an activity that was happiness-inducing. In another study, self-reported effort on a positive activity increased its effectiveness for US and South Korean participants (Layous et al. 2013), possibly because those who exerted effort were relatively more likely to believe in the activity and to feel intrinsically motivated to perform it. Accordingly, in the current study, we also sought to examine whether the amount of effort put forth by participants towards their assigned activity was positively related to gains in happiness.

2 The Current Study

To sum up, we adapted a previously-tested positive activity intervention—recalling 3 weekly positive events (see Seligman et al. 2005)—to explore the well-being and hedonic consequences of positive activities in a Japanese engineering firm. Participants were randomly assigned to practice either the positive activity or a neutral task over a 6-week period; they were assessed during the intervention period and after a 1-month follow-up.

Replicating previous research, we hypothesized that employees who performed the positive activity—and particularly those who put relatively more effort into it—would show greater increases in well-being than controls. However, due to the relative novelty of ambulatory and sociometric measurements, we did not make specific predictions regarding how practicing the positive activity might influence participants' behavior. Notably, our descriptive approach to these behavioral measures is the norm in the natural sciences, where researchers approach a new domain without hypotheses, seeking only to explain phenomena as accurately as possible (Rozin 2009).

Were we to formulate specific hypotheses, several plausible, but opposing outcomes could be proposed on the basis of prior research. For example, with respect to movement, clinical levels of depressive symptoms (often viewed as "low" well-being) are associated with both motor retardation and agitation (Hamilton 1960). Happiness, too, might be associated with higher levels of movement, as it is positively and strongly correlated with

extraversion (Costa and McCrae 1980), suggesting that people may become more active and social as they become happier. Popular culture seems to support this link between activity level and happiness. For example, the beloved children's series, Winnie-the-Pooh, has associated a lethargic, depressed Eeyore with slow, labored movements and the happy-go-lucky Tigger with a "bouncy," active gait.

On the other hand, because the activity we used in the current study is a cognitive gratitude exercise, it might relax participants and reduce stress (Emmons and Mishra 2011), therefore decreasing jittery movements such as trembling and restless pacing. Finally, because positive emotions are associated with a number of positive occupational outcomes (e.g., persisting at tasks; Sarason et al. 1986), workers may become more task-focused, productive, and prone to flow (Csikszentmihalyi 1990) as they become happier, leading to more consistent movement (Ara et al. 2009) and less social interaction among coworkers (a potentially desirable outcome for an engineering firm). In short, we approached our analyses of behavioral outcomes of positive activities as exploratory.

3 Method

3.1 Participants

Thirty-two Japanese employees (27 male, 5 female) of an engineering firm, who ranged in age from 24 to 50 years ($M = 35.31$, $SD = 6.65$), participated in this study.[1] Sixty-three percent of the participants were married, with the rest single. Participants came from one of two divisions, with five in a supervisory role. All participants were already daily wearing sociometric badges at the company for at least 3 months before the study began as part of an ongoing company project. Participants were recruited for our study via email and completed our online measures in addition to their usual work-related activities. Participants were told that participation in our study was completely voluntary and confidential and would not affect their standing at work in any way.

3.2 Design and Procedure

As part of a 6-week intervention, participants were randomly assigned to either a positive activity ($n = 15$) or neutral condition ($n = 17$). There were no significant differences in the number of supervisors or members of either work division in each group ($ps > .41$). The study was conducted entirely online in Japanese using a secure website. Upon their initial visit to the study website, participants created an account with a unique username and password that they used to enter the website during each subsequent visit. Participants reported their happiness at the beginning, middle, and end of the intervention period, as

[1] In a simulation of samples ranging from 10 to 100 at the highest level of analysis in a multilevel model (the most important level for power issues), Maas and Hox (2005) found that the parameter estimates and standard errors of parameter estimates were not biased, even when only 10 sampling units were included. Bias was only introduced with smaller sample sizes when estimating the variance components for the highest level of analysis and their corresponding standard errors. Because our effects of interest are the parameter estimates (not biased at smaller sample sizes), and their corresponding significance values, which are dependent on the standard errors of the parameter estimates (also not biased at smaller sample sizes), we do not deem our sample size to be a problem in our interpretation of significant effects.

well as at follow-up. They performed their first activity after they had completed all baseline measures (Time 1). For subsequent weeks of the intervention (Times 2–6), participants performed their assigned activity before completing survey instruments.

In the positive activity condition, participants spent 10 min per week writing about three things that went well at work during the previous week. They were told to list the positive events, explain why the events "went well," and describe their feelings—both while the event was unfolding and at the present moment. In the neutral activity condition, participants spent 10 min per week outlining work tasks completed over the past week. Control participants were told to be detail-oriented and factual in "listing" their work activities and to avoid writing down emotions, feelings, or opinions. This activity was presented as an organizational task that could plausibly boost happiness. Furthermore, we instructed participants not to just perform the activity "only in their heads," but actually type their responses.

3.2.1 Happiness

The Subjective Happiness Scale (SHS; Lyubomirsky and Lepper 1999) asks respondents to rate how happy they are in general (1 = *not a very happy person*, 7 = *a very happy person*) and relative to their peers (1 = *less happy*, 7 = *more happy*). Next, participants indicate the extent to which a description of a "very happy" person characterizes them (1 = *not at all,* 7 = *a great deal*). Excellent Cronbach's αs (ranging from .90 to .95) were observed for these three SHS items at all time points.

3.2.2 Flow

Participants recorded their degree of flow with a 3-item measure (Csikszentmihalyi 1990). They rated their level of agreement with each item on 7-point Likert-type scales (1 = *not at all*, 4 = *somewhat*, 5 = *very much*). Across all relevant time periods, good to excellent αs were observed (ranging from .91 to .95).

3.2.3 Sociometric and Ambulatory Behavioral Measures

Because our participants had already been wearing the sociometric badges at work (see Fig. 1), behavioral monitoring data were available throughout the experiment.

These badges provided (1) continual monitoring of behavioral activity level (i.e., behavioral rhythm, a measure of how the body oscillates in three dimensions, which is conceptually similar to ambulatory assessment; Fahrenberg et al. 2007) and (2) interpersonal interactions. Behavioral activity level was assessed once per minute and reported in a single score expressed in hertz. Higher values indicate more movement (e.g., walking quickly or running) and lower values indicate less movement (e.g., sitting or standing still). The badge could distinguish between states when the wearer was not moving (but the badge was still being worn) and states when the badge was not being worn (for more information about the badge technology, see Yano et al. 2012). Thus, the total amount of time employees were present at work could also be calculated from the behavioral activity level collected by the badges.

Notably, the sociometric badges also contained embedded infrared sensors that had the ability to gauge whether individuals were within a zone designed to be indicative of

Fig. 1 The present study's sociometric badges from the Hitachi Research Lab

face-to-face interaction.[2] The badges were worn on a lanyard and hung in the middle of the chest area facing out. Their infrared sensors had a 60° conic viewing space and a range of up to 2 m, which was designed to measure when two or more individuals are within a close, interpersonal distance from one another, where they are presumably communicating with one another nonverbally and verbally (although no conversations were recorded). Several times per minute, the badges "woke up" and scanned the viewable area for other badges. Then, at 1-min intervals, each badge reported the other devices it had identified. Thus, we were able to aggregate from the raw sociometric data the total amount of time each participant spent in close interpersonal proximity to other participants and other badge-wearing employees in the company (which included 145 other individuals).

Altogether, the complete set of behavioral data for the participants in our study was voluminous. The activity level data consisted of 77,706 entries (up to 1,440 entries per day per participant) spanning 179 days, and the social interaction data consisted of 7,307 entries spanning 180 days. Data for the present study were aggregated at the day level for ambulatory measures and the week level for sociometric measures. In all analyses, we used as many measurement points as were available for each participant.

Given the enormity of the behavioral data, we extracted three measurements that we believed might be amenable to change.

[2] Hitachi designed these sociometric badges to measure real-world face-to-face social interaction, and although "badge sightings" do not prove that people are actually talking, the badges only register the presence of other badges when individuals are *facing* each other (the badges are worn on the front of the chest) in *very close* proximity (i.e., less than 2 meters). Throughout the manuscript, we refer to this time as *minutes of face-to-face social interaction*, because individuals who are standing within this zone are presumed to be interacting either one-on-one or in a group (e.g., meeting). In work environments, it is implausible that individuals would be within this interpersonal zone and not actually interacting either verbally or nonverbally, even if it that activity were a simple "staring contest".

3.2.3.1 Social Interaction For each week, we aggregated the total number of minutes of face-to-face interaction per week.

3.2.3.2 Initial Daily Activity Level We averaged individuals' earliest daily behavioral activity level scores over the week. Such a value indicates how active individuals are when they first arrive at work.

3.2.3.3 Workday Duration We also used behavioral activity level values to determine how long participants were physically present at the office. However, this value merely indicates that one is present at work—not necessarily that one is productively working. Also, badges do not work outside of the office building because they require a wireless networking infrastructure to take measurements.

3.2.4 Effort

Because we specifically instructed participants not to do the activity "in their heads," but actually type their responses into our survey, a character count of participants' assigned written narrative served as a proxy for the amount of effort put into their weekly assignment (e.g., Eisenberger et al. 1982). For example, someone who just listed "coffee," "good boss," and "flexibility" would not receive as high of an effort score as someone who wrote "my coworkers had coffee ready for me in the morning and that made me feel ready to start the work day," "my boss really supported my new idea at the meeting yesterday," and "because this job gives me the freedom to spend time with my family, I was able to leave early to catch my daughter's violin recital." The total number of characters written was summed for each week, averaged across time points (Cronbach's $\alpha = .84$), and z-scored by group to account for the likelihood that the two activities differed in average levels of characters.

3.3 Analytic Approach

To account for within-person and between person changes in outcome variables, we used multilevel modeling (MLM) techniques estimated with using HLM software (Raudenbush et al. 2000). We compared baseline unconditional growth models to the hypothesis-testing models (Singer and Willett 2003) and found our hypothesis-testing models to be a better fit. Thus, only parameter estimates and effect sizes for our hypothesis testing models are included in Table 1. Group membership was effects-coded as -1 for the neutral activity group and $+1$ for the positive activity group. We entered each variable as an outcome of the Level-1 equation. In analyses of happiness scores, measurement occasion (i.e., *Time*) was entered as a within-person predictor at Level-1. In analyses of the behavioral outcomes, because we had much more baseline information for all participants, our models included two time variables as Level-1 predictors: measurement occasion ($Time_{All}$), which models the base growth rate, and time since the positive activity intervention began ($Time_{Exp}$), which reflects an increment or decrement to the base growth rate (Raudenbush and Bryk 2002). With one exception, in all analyses, we specified time predictors as fixed effects. In analyses of workday duration, however, a model with time variables specified as random effects fit significantly better than one with time as fixed effects and was therefore used to estimate coefficients.

Table 1 Multilevel modeling analyses of happiness and behavioral outcomes

Predictor	Self-report								Sociometric				Ambulatory							
	SHS				Flow				Weekly time in face-to-face interactions				Daily initial activity level				Time spent at work			
	b	*SE*	*t*	*d*	*b*	*SE*	*t*	*d*	*b*	*SE*	*t*	*d*	*b*	*SE*	*t*	*d*	*b*	*SE*	*t*	*d*
Intercept	4.77	0.26	18.67**		3.60	0.28	12.69		22.98	1.32	16.60**		216.06	8.15	26.50**		605.66	17.94	33.71**	
Time	−0.02	0.01	−1.35	−0.31	0.03	0.05	.51	.41	−0.79	0.18	−4.30**	−1.08	0.39	0.30	1.28	0.27	−2.08	0.74	−3.31**	−1.02
Group	0.04	0.02	2.41*	0.62	0.07	0.04	1.83†	1.04	−0.05	0.14	−0.34	−0.07	0.36	0.17	2.06*	0.25	−0.04	0.30	−0.12	−0.02
Effort	0.01	0.01	1.26	0.15	0.01	0.02	0.56	.20	0.05	0.03	1.35	0.07	0.11	0.03	3.20**	0.08	0.03	0.059	0.58	0.02
Group × Effort	0.02	0.01	2.14*	0.31	0.02	0.02	0.88	.29	−0.08	0.04	−2.36*	−0.11	−0.03	0.03	−0.96	−0.02	−0.14	0.059	−2.39**	−0.07

All effects are unstandardized regression coefficients. In the model predicting happiness, measurement occasion (Time) is a level 1 predictor. All level 2 variables were only included in the equation predicting the slope of time. The sociometric and ambulatory models included two time variables as level 1 predictors: measurement occasion and time since the intervention began. All level 2 variables were only included in the equation predicting slopes of experimental time (depicted here as "Time"). In all models, group is coded as −1 for control and +1 for experimental. With the exception of workday duration, time variables were fixed effects. Cohen's *d*s were calculated with the following formula: $d = 2b(\text{time})/SD_{\text{raw}}$ where *b* is the unstandardized regression coefficient of interest, time is the amount of time included in the model analyses (for SHS it was 10 weeks, for weekly time in interaction it was 6 weeks, and for daily behavioral indicators it was 42 days), and SD_{raw} is the standard deviation of the dependent variable across groups at baseline (Feingold 2009). The coefficient is initially multiplied by two to account for our coding scheme. Baseline standard deviations were as follows: SHS = 1.30, Flow = 1.30. Weekly time in face-to-face interactions = 8.76, daily initial activity level = 120.42, time spent at work = 170.59. Confidence intervals around each parameter estimate can be calculated using the following equation: $b \pm 1.96[SE(b)]$ (Singer and Willett 2003)

† $p < .10$;* $p < .05$; ** $p < .01$

In analyses of happiness, variables representing group, effort, and the Group X Effort interaction were entered as between-persons predictors of the slope of time at Level-2. In the behavioral data, Level-2 variables were used to predict slopes of $Time_{Exp}$ (the time since the intervention began). As our interest lay in individuals' change over time and not their baseline levels, no Level-2 predictors were entered to predict changes in the intercept of each level one equation. The combined MLM equation for self-report data analyses was the following:

$$\begin{aligned} Outcome_{ij} = {} & \gamma_{00} + \gamma_{10} + (Time) + \gamma_{11}(Group)(Time) + \gamma_{12}(Effort)(Time) \\ & + \gamma_{13}(Group)(Effort)(Time) + r_{ij} + u_0 \end{aligned}$$

The combined MLM equation for behavioral data analyses with time as a fixed effect (weekly time in face-to-face interactions and daily starting activity level was the following:

$$\begin{aligned} Outcome_{ij} = {} & \gamma_{00} + \gamma_{10}(Time_{All}) + \gamma_{20}(Time_{Exp}) + \gamma_{21}(Group)(Time_{Exp}) \\ & + \gamma_{22}(Effort)(Time_{Exp}) + \gamma_{23}(Group)(Effort)(Time_{Exp}) + r_{ij} + u_0 \end{aligned}$$

The combined MLM equation for behavioral data analyses with time as a random effect (workday duration) was the following:

$$\begin{aligned} Outcome_{ij} = {} & \gamma_{00} + \gamma_{10}(Time_{All}) + \gamma_{20}(Time_{Exp}) + \gamma_{21}(Group)(Time_{Exp}) \\ & + \gamma_{22}(Effort)(Time_{Exp}) + \gamma_{23}(Group)(Effort)(Time_{Exp}) \\ & + r_{ij} + u_0 + u_1(Time_{All}) + u_2(Time_{Exp}) \end{aligned}$$

At baseline, the experimental and control groups did not differ significantly in any of the outcome variables. All predictors were uncentered.

4 Results

4.1 Happiness

First, we compared the trajectories of the positive activity and neutral activity groups for self-reported happiness (Table 1). Consistent with our predictions, participants who considered three positive events at work showed sustained happiness across time relative to the grand mean, $\gamma_{11} = 0.07$, $SE = 0.03$, $t(27) = 2.40$, $p = .02$. Furthermore, a significant group by effort interaction revealed that the relationship between practicing an activity and changes in happiness depended on participants' effort, $\gamma_{13} = 0.03$, $SE = 0.01$, $t(27) = 2.10$, $p = .05$. Participants who devoted more effort to the positive activity showed greater increases in happiness across time relative to any other combination of effort and activity (see Fig. 2, left).

4.2 Behavioral Outcomes

Next, we examined the sociometric and ambulatory data to determine whether our participants behaved differently depending on whether they practiced a positive activity versus a control activity and depending on how much effort they exerted.

First, analyses of our participants' social interactions revealed a group by effort interaction, indicating that the relationship between practicing an activity and changes in time spent in social interaction depended on participant's efforts, $\gamma_{23} = -0.08$, $SE = 0.04$,

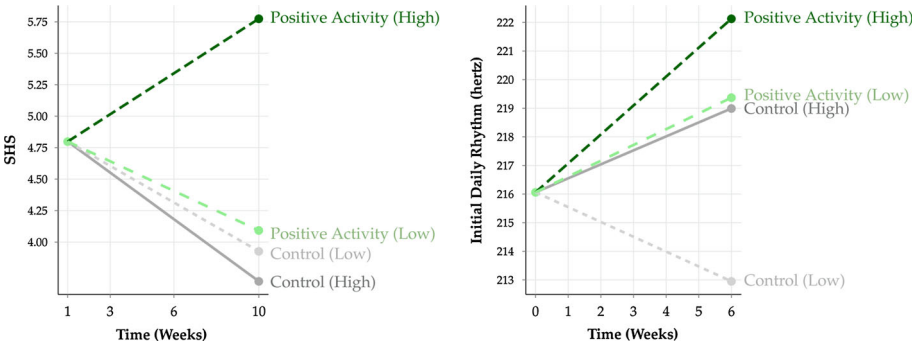

Fig. 2 Changes in happiness by group and effort (*left*) and changes in initial behavioral activity level by group and effort (*right*)

$t(28) = -2.36$, $p = .02$. Those mustering more effort toward the positive activity showed a greater reduction in time spent in social interaction with peers compared with those mustering less effort toward the positive activity. Altogether, the social interaction analyses suggest that devoting high effort to the positive activity in particular, relative to the neutral activity, appeared to curtail social interaction.

Second, we examined group and effort differences in ambulatory behavior. Participants who considered three good things showed higher behavioral activity level scores at the beginning of each work day compared with those who considered tasks they had completed, $\gamma_{21} = 0.36$, $SE = 0.17$, $t(28) = 2.06$, $p = .04$. Additionally, those who mustered more effort across both groups showed higher behavioral activity level scores at the beginning of each work day compared with those who devoted less effort, $\gamma_{22} = 0.11$, $SE = 0.03$, $t(28) = 3.20$, $p = .002$ (see Fig. 2, right).

Finally, we examined the time participants spent at work. On average, our participants spent 10.61 h each day at the office. However, controlling for baseline work patterns, they tended to spend less time at work as the intervention progressed. Although no significant main effects emerged for experimental group or participants' effort, we found an interaction between these two variables, such that the relationship between practicing an activity and changes in time at work depended on participants' effort, $\gamma_{23} = -0.14$, $SE = 0.06$, $t(28) = -2.39$, $p = .02$. More effort predicted shorter workdays, but only for those writing about three things that went well each week.

The reduction in social interaction and time spent at work for people who put more effort into the positive activity could be at least partially explained by our finding that those in the positive activity condition reported marginally higher levels of flow than controls, $\gamma_{21} = 0.07$, $SE = 0.04$, $t(28) = 1.83$, $p = .08$. Possibly people who wrote about three positive work-related events felt more engaged with their work throughout the day and thus were less likely to interact with coworkers and more likely to finish their work quickly and return home.

5 Discussion

Our study sought to test whether recalling three good things at work would not only raise the happiness of employees in a non-Western workplace, but actually shift the employees'

behavior, as reflected in sociometric and ambulatory measures. In addition, we examined whether greater effort in performing the positive activity would predict larger increases in employee well-being.

Consistent with prior work on positive activities, participants who recalled positive events each week became happier over time than those who outlined tasks they had completed. Our findings build on previous theory and research indicating that intentional activities can boost well-being for extended periods. In our case, the benefit persisted for as long as 10 weeks (see Fig. 2, left). In addition, by conducting this study in a Japanese workplace, we have shown that positive activity interventions may be generalizable to other cultures and settings. Increasing positive emotions in the workplace might be especially important, as research suggests that happy employees are more productive and exhibit more prosocial behavior toward coworkers (Boehm and Lyubomirsky 2008).

Furthermore, consistent with our hypotheses, those who invested more effort into the positive activity demonstrated significantly larger gains in happiness across time. Previous research supports the idea that commitment to a goal or positive activity impacts the benefits one derives from attaining or practicing it (Brunstein 1993; Lyubomirsky et al. 2011). Along this line of thinking, we speculate that participants who devoted less effort to the positive activity may have been those who felt forced or compelled to perform it, which could have undermined their sense of self-determination (Ryan and Deci 2000). Therefore, imposing positive activities on people (albeit with good intentions) could backfire. However, we cannot be confident of causal interpretations, because effort was not manipulated in this study.

Notably, we found behavioral differences in participants' social interactions and movement patterns as a result of their participation in the study. Employees who wrote about three good things at work each week arrived at the office with higher levels of activity (i.e., moving more) than those who wrote about the work tasks they completed. Although our behavioral data has no inherent emotional valence in isolation, these findings potentially suggest that recalling work-related positive events may lead employees to become more energetic and work-oriented over time. Consistent with this "diligent worker" explanation is the finding that high-effort participants (regardless of experimental group) also fit this pattern of results—that is, they arrived at work with more energy. These results are also consistent with a recent finding that older adults' gait speed on a walking test is positively associated with enjoyment of life (Steptoe et al. 2014).

With respect to social behavior, writing about positive events (vs. work tasks) appeared to reduce participants' social interactions, as evidenced by significant decreases in time in face-to-face interactions for participants devoting high effort to the positive activity (e.g., taking it seriously). This finding may be surprising given the robust association between social relationships and happiness (Lyubomirsky et al. 2005), but we contend that having supportive friends and family does not necessitate that one continuously interacts with them. Possibly happier people report having strong social relationships, but are also able to focus when the situation requires it (e.g., at work). Indeed, research has shown that relatively happier people are also more productive (Wright et al. 2002), more persistent at tasks (Sarason et al. 1986), and engage in more substantive conversations (rather than small talk; Mehl et al. 2010). Assuming that reduction in social interaction is a beneficial outcome (see Limitations), we speculate that recalling personal, work-related triumphs may inspire and motivate workers to focus and work harder—an interpretation also consistent with these participants' marginal increases in flow. Further supporting the link between positive activities and productivity, a randomized controlled study in a Spanish workplace found

that participants who practiced kindness over a month significantly increased flow compared with a control group (Chancellor et al. 2013).

Significant differences also emerged in the amount of time participants spent at work. Participants in the positive activity condition—and especially those who mustered great effort—tended to spend less time at work throughout the study. Of course, cultural differences in East Asia are worth mentioning, as the typical workday in Japan is longer than that of most other nations (Iwasaki et al. 2006). One interpretation is that employees could be social loafing at work (George 1992). Alternatively, given our earlier finding suggesting that the positive activity led workers to become more active earlier in the day, we speculate that employees may simply be completing their necessary tasks and leaving work early. Alternatively, considering all their successes at work may have made employees simply *feel* that they have worked hard enough.

Altogether, the behavioral measures used in our study are noteworthy in that they reflect changes in the way participants actually acted as a result of recalling positive events. Whereas self-report measures represent subjective evaluations of internal feelings and thoughts, measures of body movements and social interactions represent objective differences in the way employees behave at work. As such, our findings offer persuasive evidence to support the thesis that even brief intentional positive activities can bring about "real" measurable behavioral differences in practitioners.

5.1 Limitations

Our study's most salient limitation was the sample size. Indeed, the present study's sociometric badges require a great deal of additional computing infrastructure to capture and store real-time sociometric measurements (e.g., servers, wireless networks, and charging stations). Despite the small sample size, however, we were still able to detect significant differences between groups. Also, as we mentioned earlier (p. 8), fewer Level-2 sampling units primarily bias variance estimates of random effects more so than the regression coefficients (Maas and Hox 2005).

We used the number of characters typed as a proxy for the amount of effort participants devoted (see Eisenberger et al. 1982, for evidence linking text length to effort). Participants who volunteer one-word responses are likely to be trying less hard than those providing detailed descriptions of their weekly events. Unfortunately, character-counting may lose validity when the responses of low-effort participants are voluminous but flippant and those of high-effort participants are concise but pensive. Future alternative approaches include obtaining third-party ratings of participants' written responses or using self-reported effort, seriousness, or commitment (Lyubomirsky et al. 2011). In support of our approach's validity, however, participants were specifically instructed to spend 10 min on each activity and write down their thoughts rather than perform the activity "in their heads." Overall, character counts should indicate how seriously participants treated the activity, by reading instructions and devoting effort to it in accordance with those instructions.

To the best of our knowledge, participants were already accustomed to wearing their sociometric monitoring badges, which resemble identification badges or smart cards that workers carry in secure corporate environments. Even when behavioral monitoring takes place in an artificial environment (such as a laboratory), or is obvious (e.g., visible video cameras) and intrusive (e.g., 24-h monitoring), such methods can still have ecological validity and analyses may only underestimate the actual effect sizes (e.g., Fincham 2003).

In contrast, the present study's sociometric badges were worn in workers' normal working environments over months and are relatively small and unobtrusive.

As discussed earlier, changes in behavior (i.e., activity patterns, time spent in face-to-face interaction, and time spent at work) are not necessarily positive or negative. Because the participants who practiced recalling positive events at work did become happier and reported marginally more flow, we interpreted their subsequent behavioral shifts with that emotional context in mind. However, given the robust association between social interaction and happiness, our social interaction finding (and its interpretation) may seem at odds with prior literature.

We contend that context can help illuminate the valence of behavioral patterns. For example, suppose Dan practiced recalling positive events, while Tom practiced a neutral activity. Relative to Tom, Dan became happier and then drove his car more miles over the next week. Although ample evidence links commuting with *reduced* happiness, we would speculate that as Dan felt happier, he felt more energetic and chose to actively engage in more activities—including driving. However, as evident in this analogy, the results obtained could be highly dependent on context (i.e., American car culture) and the level and type of driving involved (e.g., whether Dan's extra driving compounded his daily commute or marked a simple pleasure). Similarly, we argue that, although our results may be highly dependent on the context of the study and the sample of participants, the behavioral differences observed could be indicative of broader patterns of positive changes and are worth investigating and reporting.

Finally, given the small sample size, we were unable to compare participants on demographic factors that may have affected the success of the intervention (e.g., gender, work roles). Although most individual difference concerns are eliminated due to random assignment to groups, others factors might not be fully represented in our sample. For example, our sample was entirely composed of employees at a single Japanese engineering firm, so the generalizability to other Japanese workers may be limited. Additionally, our sample was predominately male. The nature of the workplace (i.e., engineering firm) and the fact that participants were male could mean that our results are dependent on this context—especially in regard to decreased social interaction. Furthermore, researchers posit that individual characteristics should moderate the effectiveness of happiness-promoting interventions (Layous and Lyubomirsky 2014), and active research continues in this area. In sum, although our study represents an important first step in understanding positive activities within a Japanese workplace, the small sample size of employees from one firm does not allow for broad generalizations. In the future, researchers should ensure that participants' sex is balanced and recruit workers from a variety of industries.

5.2 Concluding Remarks and Future Questions

Although the systematic investigation of happiness-boosting activities has blossomed in the past decade, investigators are still accumulating evidence that sustainable happiness is possible and identifying the specific mechanisms that bring it about. First and foremost, our study presents more evidence that brief positive activities can produce changes that persist over several months. Positive activity interventions conducted over longer time periods, such as one or more years, would provide even more compelling evidence for the durability of well-being and behavioral boosts.

New technology now offers an array of objective behavioral variables to complement self-reports. The present study offers an imperfect, but notable contribution to psychological research (see Rozin 2009) by integrating unobtrusive behavioral measures rather

than relying exclusively on self-reports (Baumeister et al. 2007). We believe that researchers need both behavioral and subjective measures to fully understand their participants' experiences. Behavioral measures do not, however, by themselves, indicate valence: Changes in social interaction and movement could reflect shifts that are advantageous, counterproductive, or neutral. For example, the manner by which we measured our participants' time at work—using behavioral activity level—does not necessarily indicate that the time was productive. Future researchers may wish to replicate our findings with more nuanced measures of devotion to work or quality of work time, as well as with additional subjective reports, which may help decipher, for example, whether employees' high levels of movement reflect their "jumping for joy" or being "hopping mad."

Notably, we employed a Japanese sample, bolstering the generalizability of previous studies that relied primarily on Western samples. Of course, to more fully understand cultural differences in practicing positive activities, future studies need to use multiple cross-cultural samples practicing the same activity (for example, Boehm et al. 2011; Layous et al. 2013). In addition, our study was conducted in an occupational setting, a relatively new and important frontier in research involving the effects of targeted interventions on sustainable well-being. Our findings show that even short-term positive activities can help employees be happier and potentially more productive and more engaged at work. As happiness promotes career success (see Boehm and Lyubomirsky 2008, for a review), we believe employers should view boosting workers' well-being and productivity as complementary goals. Because employed adults spend many of their waking hours at work, psychologists looking to design practices and environments that foster well-being should make research in occupational settings a high priority.

Simple, inexpensive, efficacious interventions, like the one used in the present study, can boost employees' happiness, mental health, and productivity. As a contrast, occupational or personal interventions guided by a coach, therapist, or consultant are typically costly and time consuming. Positive activities, however, represent self-administered interventions that are relatively convenient and hassle-free, can be delivered through the Internet for a relatively trivial cost, are brief and non-stigmatizing, and scale exponentially to service a large number of people (i.e., without the need of adding more trained personnel). Although brief intentional activities such as recalling positive events—or writing gratitude letters or doing acts of kindness—sometimes seem trivial, such activities stand the best chance of fostering substantial positive changes in not just individuals, but entire communities and workplaces.

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