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Factors that influence planning for physical activity among workers in small- and medium-sized enterprises

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ABSTRACT

Physical activity (PA) is necessary for improving the health of workers in small- to medium-sized enterprises (SMEs). However, behavioral changes conducive to PA are often difficult to achieve despite intentions. Because intention to perform PA does not always translate to action, proper planning may be critical for achieving PA. In this study, we aimed to identify factors related to planning for PA among workers in SMEs because this is one population that has been identified as being at higher risk for lifestyle-related diseases in Japan. Participants completed a series of validated questionnaires. Of 353 valid responses, 226 individuals (149 men; aged 47.5 ± 8.7 years) stated their intention to perform PA. Multiple regression analysis indicated that a higher PA planning score was significantly associated with higher self-efficacy for PA ($p < 0.001$), higher risk perception regarding inactivity ($p = 0.012$), and greater knowledge of information about PA community services ($p = 0.019$). Therefore, we recommend that self-efficacy, risk perception, and information regarding PA community services are enhanced in the daily working lives of workers at their workplaces. In this manner, they can promote their planning of health behavioral changes in a supportive environment, drawing upon available services, supports, and other resources.

1. Introduction

Evidence supporting the importance of physical activity (PA) as a form of preventive medicine is currently overwhelming. Many studies have reported lack of PA as being associated with negative health issues, such as metabolic syndrome (Kim et al., 2011), heart disease (Sieverdes et al., 2010), depression (Teychenne et al., 2010) and mortality (Stensvold et al., 2011). Conversely, performing PA results in improved pathogenesis and symptoms of specific conditions, including chronic heart failure, coronary heart disease, dyslipidemia, hypertension, obesity, type 2 diabetes, life expectancy (Lee et al., 2012) and overall quality of life (Choi et al., 2017; Vancampfort et al., 2017).

Despite the known potential benefits of performing PA, the number of sedentary adult workers is increasing worldwide, including in Japan. Recommended levels of PA for adults aged 18–64 years are at least 150 min of moderately intense aerobic PA throughout the week, or at least 75 min of vigorously intense aerobic PA throughout the week, or an equivalent combination of moderate and vigorous intense activity (WHO, 2017b). However, in an investigation conducted by the Lancet Physical Activity Series Working Group, up to 31.1% (95% confidence interval 30.9–31.2) of adults (≥15 years) from 122 countries were found to be physically inactive (Hallal et al., 2012). Additionally, the World Health Organization (WHO) reported that globally, approximately one in four adults aged ≥18 years do not perform PA to recommended levels (WHO, Fact Sheet, 2017a). In Japan, 90% of the adult working population reportedly intend to perform PA; however, < 30% of people actually perform recommended levels of PA, including activities undertaken while working and during recreation (Ministry of Health, Labour and Welfare: National Health and Nutrition Survey, 2013). While most able individuals would like to perform PA to improve their health, intention to perform PA often does not always translate into actual pursuit of activities (Sheeran, 2002). This begs the question, “Why do so many people find it difficult to act on their intentions to perform PA?” One reason appears to be a lack of adequate “planning” (Cao et al., 2013; Shimizu et al., 2013; Wiedemann et al., 2009; Sutton, 2008). “Planning” is the phase that lies between intention and action, and specifies when, where, and how to carry out the intention for PA (Cao et al., 2011). The relationship between intention, planning, and action is explained by the Health Action Process Approach (HAPA), which was developed by Schwarzer (1992). The main feature of this model lies in the explicit distinction between a decision-making or motivation stage, including intention, and an action or

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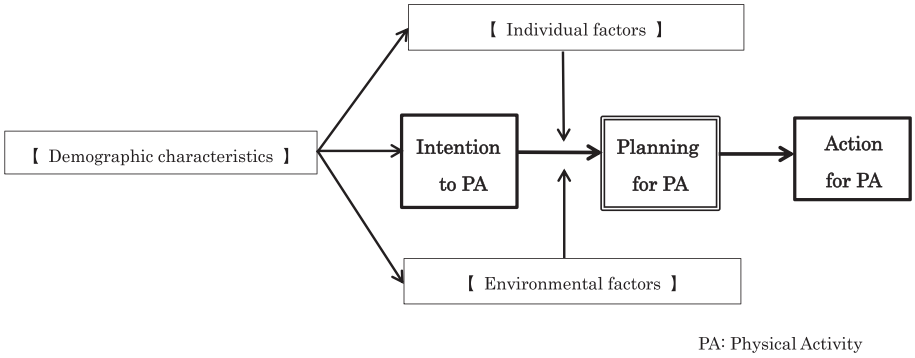

Fig. 1. Conceptual framework of the study.

maintenance stage (Schwarzer, 1992). Essentially, people who intend to perform PA require adequate planning to do so.

While the relationships between intention and action for PA have been previously examined, few studies have investigated the actual factors directly related to planning. Moreover, the factors related to planning for PA that have been studied to date include non-interventional individual demographic variables, such as education level, household income, and autonomous regulation (Amazaki and Kemuriyama, 2015; Cao et al., 2011; Lippke et al., 2009). Additionally, these studies recruited adults via the internet and did not focus on employees working in small- to medium-sized enterprises (SMEs). SMEs are non-subsidiary, independent firms that employ fewer than a certain number of employees (this number varies across countries). SMEs are generally those with fewer than 50 employees, while micro-enterprises have at most 10 workers, or in some cases, five (OECD, 2001). SMEs often experience difficulties in complying with occupational health and safety regulations owing to fewer resources and are often less aware than large companies of costs incurred owing to non-compliance, such as exposing themselves to high-risk situations (Zou et al., 2015; Nowrouzi et al., 2016). In Japan, 70% of all workers are employed in SMEs (Ministry of Internal Affairs and Communications, Economic census, 2012). Among these employees, higher proportions of health and behavioral problems, such as hypertension, obesity, and smoking, have been found compared with those employed in larger organizations (Hoshuyama et al., 2007). Workers employed in SMEs have been reported to have a significantly higher odds ratio of work intensity, alcohol consumption, and being a current smoker than those employed in large-scale enterprises (Kubo et al., 2006). To justify the prevalence of middle-aged workers, we added national survey data; i.e., the rate of obesity surges among the adult male working population in Japan among those aged in their 30 s, encompassing > 30% among those aged 30–59 years (Ministry of Health, Labour and Welfare: National Health and Nutrition Survey, 2013). Workers holding certain higher-stress positions in SMEs are among those who should consider performing PA to offset the effects of stress due to not only hard work but also advancing age. We consider that middle-aged people are at risk of lifestyle-related diseases, and that this risk should be decreased. However, to our knowledge, no study has to date examined environmental and individual factors related to performing PA as a form of preventive medicine among SME employees. Identifying environmental and individual factors related to performing PA among SME employees is important for development and improvement of preventive medicine not only for individual workers, but also for the health of society as a whole. The objective of this study was to identify factors related to successfully planning for PA among workers in SMEs.

2. Methods

2.1. Study participants

In this study, we focused on middle-aged workers of SMEs residing in Yokohama, (population: 3.7 million), Japan. We informed a total of 213 SMEs, certified by the Yokohama city government as holding corporate social responsibility (CSR), i.e., they meet criteria concerning human rights, corporate governance, health and safety, environmental effects, working conditions, and contribution to economic development. This CSR certification was used ensure a certain standard company level in each SME, from which study participants were recruited. We informed 213 SMEs holding a CSR certificate via telephone or letter about the study. After informing them, 54 SMEs agreed to study participation. We sent 583 questionnaires to workers of 54 SMEs, and 436 responses were retrieved. We excluded 83 of these 436 questionnaires, and selected 353 employees who were aged 30–64 years at the time of the study. We divided the 353 workers into absence or presence of intention groups, and 226 people who were identified as having intention were further divided into high or low planning groups.

2.2. Study design

This was a cross-sectional study comprising self-administered questionnaires that were sent and returned via mail. A total of 583 eligible workers at 54 SMEs were included in the study. We sent a questionnaire and an informed consent letter to each participant via their SME addresses; each was asked to complete the questionnaire anonymously.

2.3. Dependent variable

Fig. 1 shows the conceptual framework of this study. We focused on planning from intention to action in health behavioral changes with respect to PA. “PA intention” was measured using the Behavioral Intention Scale for PA (Amazaki et al., 2013a). The scale was used to divide participants into two groups. The scale consists of five items, and responses were assessed using a 5-point register. The total possible scores lay between 5 and 25, with higher scores indicating a higher degree of intention to perform PA. The reliability of the scale was established with Cronbach's $\alpha = 0.824$, and the structural validity of the scale was as follows: goodness of fit index (GFI), 0.981; adjusted goodness of fit index (AGFI), 0.942; comparative fit index (CFI), 0.978; and root mean square error of approximation (RMSEA), 0.094 (Amazaki et al., 2013a).

“Planning for PA” was determined using the Planning Scale for PA (Amazaki et al., 2013a). The scale includes 10 items in two planning categories: coping and action. Responses were assessed using a 5-point scale. The total possible scores lay between 10 and 50, with higher scores indicating a higher degree of planning for PA. The reliability of

Table 1
Demographic characteristics of participants.

				(*n* = 226)
		N	n or mean ± SD	% or (range)
Age		226	47.5 ± 8.7	(30–64)
Sex	Male	226	149	65.9
Household composition	Spouse and Children	226	44	35.5
	Live alone		30	24.2
	Parents		20	16.1
	Spouse		15	12.1
	Children		7	5.6
	Spouse and Parents		7	5.6
	Spouse, Children, and Parents		1	0.8
Marital status	Married	226	154	68.1
	Unmarried		45	19.9
	Divorced		24	10.6
	Widowed		3	1.3
Educational status	Junior high school/ High school	226	90	39.8
	Vocational college/ Junior college		65	28.8
	College or university/ Graduate school		71	31.4
Household income	Sufficient	224	9	4.0
	Slightly sufficient		116	51.8
	Slightly insufficient		81	36.2
	Insufficient		18	8.0
Employment status	Fulltime worker	225	185	82.2
	Part-time worker		25	11.1
	Others		15	6.7
Occupation	Construction	225	105	46.7
	Manufacture		47	20.9
	Electricity, gas, heat supply, and water		16	7.1
	Compound services		8	3.6
	Living-related and personal services		7	3.1
	Finance and insurance		7	3.1
	Academic researcher and technical services		7	3.1
	Agriculture, forestry and fisheries		2	0.9
	Information and communications		2	0.9
	Medical and welfare		2	0.9
	Wholesale and retail trade		2	0.9
	Others		20	8.9
Working hour per day (hours)		225	7.8 ± 1.2	(3.0–13.5)
Work activity	Inactive	223	122	54.7
	Regular		55	24.7
	Active		33	14.8
	Very active		13	5.8
Commuting hour per day (minutes)		225	39.2 ± 24.8	(0–120.0)
Overweight	Mean BMI	222	23.9 ± 3.9	(16.0–43.4)
	BMI≧25		78	35.1

Missing data were excluded in each analysis.

the scale was established with Cronbach's α = 0.911, and the structural validity of the scale was as follows: GFI, 0.934; AGFI, 0.893; CFI, 0.959; and RMSEA, 0.095 (Amazaki et al., 2013a).

2.4. Independent variables

2.4.1. Demographic characteristics

The participants' demographic characteristics are displayed in Table 1 and include basic attributes, such as age, sex, household composition, marital status, educational status, household income, employment status, occupation, working hours, work activity, commuting hours, and body mass index. Household income was measured along a 4-point Likert-type scale, ranging from 1 (insufficient) to 4 (sufficient).

2.5. Individual factors

Individual factors included health-related activities, self-perceived health, self-efficacy, outcome expectancy, risk perception, health literacy, and mental status.

Health-related activities encompassed eight items: smoking, alcohol consumption, breakfast intake, sleeping hours, working hours, PA, nutritional balance, and perceived stress; these were measured using the health practice index (HPI) (Morimoto, 1987). The HPI was measured as either 0 (absence) or 1 (presence). Self-perceived health was measured along a 4-point Likert-type scale, ranging from 1 (very poor) to 4 (very good). Self-efficacy for planning for PA was measured using the PA self-efficacy scale, which consists of four items rated along a 5-point Likert scale that ranges from 1 to 5 (Amazaki et al., 2013a). The total score ranged from 4 to 20, with higher scores indicating greater self-efficacy. Outcome expectancy was measured using the Outcome Expectancy Scale for Physical Exercise (Amazaki et al., 2013b). Each item was evaluated along a 5-point Likert scale, ranging from 1 to 5. The outcome expectancy score ranged from −20 to 20, with a higher score indicating a more positive outcome expectancy. Risk perception was measured using the Risk Perception Scale for inactivity, which consists of five items rated along a 5-point Likert scale that ranges from 1 to 5 (Amazaki, 2012). The total score ranged from 5 to 25, with higher scores indicating higher risk perception. The validated, Communicative and Critical Health Literacy scale (Ishikawa et al., 2008) consists of five items measured along a 5-point Likert scale, with scores ranging from 5 to 25, (higher scores indicate higher health literacy). Mental status was measured using the Kessler K6 scale comprising a 5-point Likert scale, ranging from 0 to 4 (Sakurai et al., 2011; Furukawa et al., 2008). This scale consists of six items inquiring how frequently respondents experienced symptoms of psychological distress during the past 30 days. The total score ranged from 0 to 24, with higher scores indicating more severe mental distress.

2.6. Environmental factors

Participants answered questions regarding environmental factors, including information about PA services, locations to perform PA, and social support. Information regarding PA community services was measured along a 4-point Likert-type scale, ranging from 1 (little) to 4 (a lot). PA locations within the vicinities of workers' residential and workplace areas were determined by using a 4-point Likert-type scale, ranging from 1 (not at all true) to 4 (exactly true). Social support was measured using a portion of the Brief Job Stress Questionnaire (Shimomitsu, 2002-2004; Kato, 2000), which consists of nine items divided into three domains: 1) superiors, 2) co-workers, and 3) spouse, family, and friends. Responses to the scale were assessed using a 4-point scale. The total scores ranged from 3 to 12, with higher scores indicating good social support.

2.7. Statistical analysis

In this study, we focused on participants from intention to action of PA. Then, we divided the participants into two groups by 18 of the mean of the intention scale for PA among participants. Participants' demographic characteristics were subjected to descriptive statistics, following which univariate analysis by using Spearman's correlation method was used to examine correlations between dependent and independent variables. Multiple regression analysis was then conducted to identify factors related to planning among workers, using all

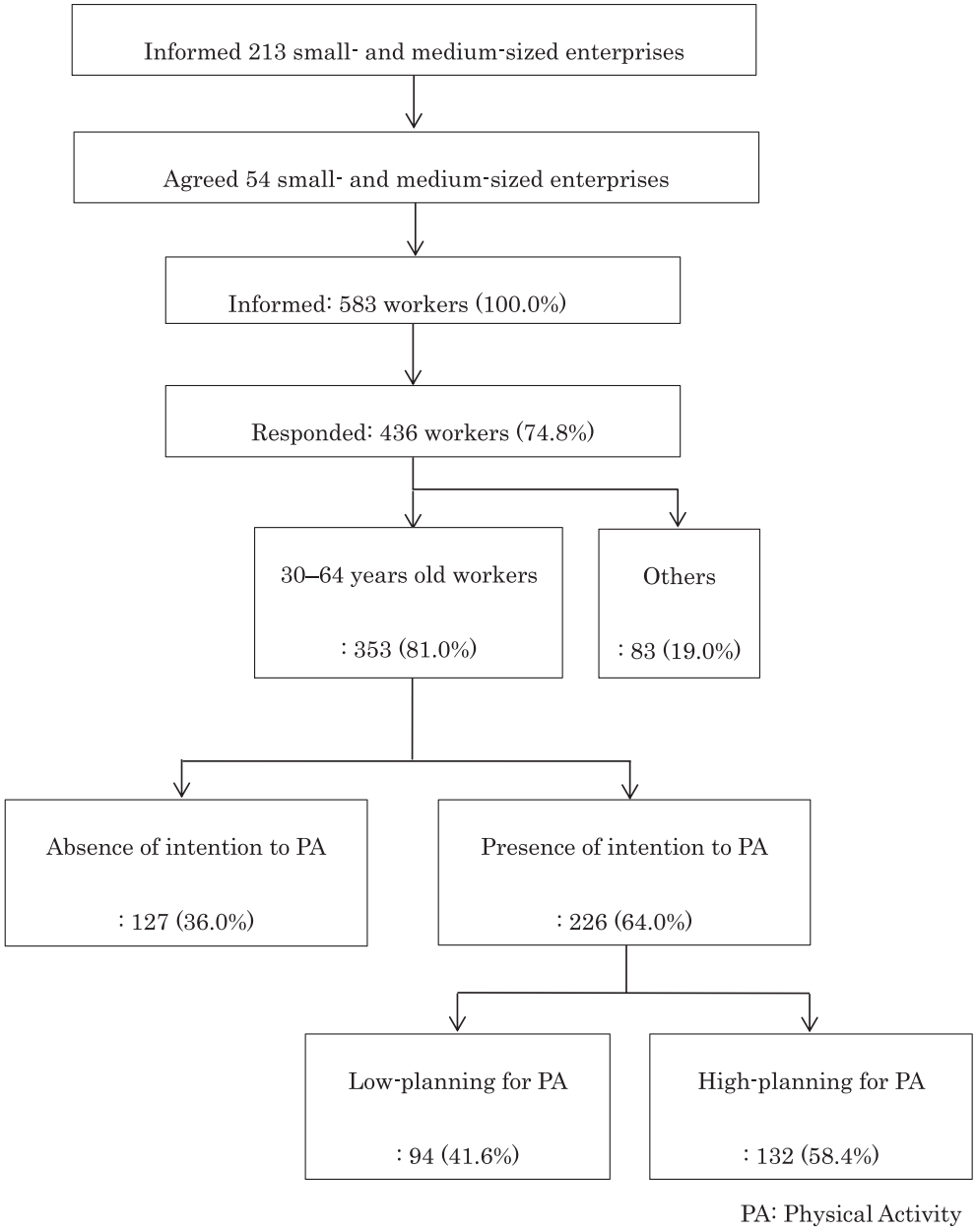

Fig. 2. Flowchart of participant recruitment and division into groups.

potentially significant predictors identified by univariate analysis ($p < 0.05$) as independent variables via backward elimination. All analyses were conducted using IBM® SPSS for Windows, version 22.0. Statistical significance was set at $p < 0.05$.

2.8. Ethics

The Institutional Review Board of the Medical Department of Yokohama City University approved this study on 23 July 2015 (ID: A150723016).

3. Results

Fig. 2 is a flowchart describing the study procedure. A total of 583 questionnaires were sent to workers from all 54 SMEs in Yokohama city that agreed to study participation; 436 responses were returned (response rate: 74.8%) of which 353 were valid (effective response rate: 81.0%). We excluded 83 questionnaires from the 436 responses received, because the workers who completed these excluded questionnaires were not aged 30–64 years at the time of the study. Of 353 participants, 226 (64.0%) stated their intention to perform PA. These 226 participants were identified for analysis because our study focus was the planning stage between intention and action with respect to PA. Cronbach's α was 0.9 for self-efficacy, 0.68 for outcome expectancy, 0.76 for risk perception, 0.86 for health literacy, 0.88 for K6, and 0.85 (superiors), 0.81 (co-workers), 0.87 (spouse, family, and friends), and 0.88 (the neighborhood) for each domain of social support. Table 1 shows these individuals' demographic characteristics. Table 2 displays the individual factors and Table 3 shows the environmental factors of the participants. The mean score of intention was 21.1 ± 2.3 (range, 18–25), and the score of planning was 28.7 ± 8.6 (range, 10–50). In a single correlative analysis, individual factors showing significant correlations with the planning for PA were breakfast intake, working hours, nutritional balance, self-rated health, self-efficacy for PA, outcome expectancy, inactivity risk perception, and health literacy. Environmental factors showing significant correlations with planning for

Table 2
Individuals factors of participants.

		N	n or mean ± SD	% or (range) (n = 226)
Twice a week,≧30 min PA	Yes	226	70	31.0
Health-related activities	No smoking	226	110	48.7
	Non or sometimes drinking alcohol		151	66.8
	Breakfast every day		172	76.1
	Sleeping 7–8 h		84	37.2
	Working ≦9 h		153	67.7
	More than once a week PA		96	42.5
	Considering nutritional balance		169	74.8
	Low or middle perceived stress		132	58.4
Self-perceived health	Very good	223	17	7.6
	Fairly good		154	69.1
	Fairly poor		44	19.7
	Very poor		8	3.6
Self-efficacy for PA (scores)		226	12.0 ± 3.6	(4–20)
Outcome expectancy (scores)		226	5.8 ± 5.3	(−7–20)
Risk perception for inactivity (scores)		226	15.9 ± 3.7	(5–25)
Health literacy (scores)		226	3.5 ± 0.8	(1–5)
K6 (mental status)	Scores	226	5.7 ± 5.1	(0−20)
	≧5 points (cut-off score for mental distress)		110	48.7

PA: physical activity.
Missing data were excluded in each analysis.

Table 3
Environmental characteristics of participants.

		N	n or mean ± SD	% or (range) (n = 226)
Information regarding PA community (public) services[a]	A lot	226	4	1.8
	Some		56	24.8
	Just a little		106	46.9
	Little		60	26.5
Locations to perform PA in the vicinity of the residential area[b]	A lot	225	41	18.2
	Some		94	41.8
	Just a little		70	31.1
	Little		20	8.9
Time taken to reach places for PA in the vicinity of the residential area (minutes)[c]		134	13.3 ± 8.2	(0–40)
Locations to perform PA in the vicinity of the workplace[d]	A lot	224	22	9.8
	Some		59	26.3
	Just a little		94	42.0
	Little		49	21.9
Time taken to reach places for PA in the vicinity of the workplace (minutes)[e]		78	11.7 ± 7.0	(1.0–35.0)
Social support (scores)	Superiors	225	7.6 ± 2.4	(3−12)
	Co-workers		7.6 ± 2.2	(3–12)
	Spouse, Family, Friends		9.7 ± 2.2	(3–12)
	Neighborhood		5.7 ± 2.3	(3–12)

PA: physical activity.
Missing data were excluded in each analysis.
[a] Do you know about the services and projects related to exercise currently being implemented in the community by the government?
[b] How many opportunities to be active or places that can be utilized for exercise are available in your area of residence?
[c] Concerning your area of residence, what is the travel time to the exercise facilities/locations?
[d] How many opportunities to be active or places that can be utilized for exercise are available in the vicinity of your workplace?
[e] Concerning the vicinity of your workplace, what is the travel time to the exercise facilities/locations?

PA were information about PA community services, PA locations in residential areas, and social support from superiors, co-workers, and neighbors. Table 4 shows only significant factors, i.e., higher self-efficacy for PA ($\beta = 0.484, p < 0.001$), higher risk perception of inactivity ($\beta = 0.246, p = 0.012$), and greater knowledge of information about PA community services ($\beta = 0.234, p = 0.019$), that on multiple regression analysis were significant predictors of higher PA planning scores among workers in SMEs who intended to perform PA, accounting for 36.4% of the variance.

Table 4
Multiple regression analysis of the planning for PA.

	β	*p-value*	(n = 226)
Individual factors			
Self-efficacy for PA	0.484	0.001	***
Risk perception for inactivity	0.246	0.012	*
Environmental factors			
Information regarding PA community services	0.234	0.019	*
Adjusted R^2	0.364		

Multiple regression analysis:forced entry method.
***$p < 0.001$, *$p < 0.05$.
PA:Physical activity.
Dependent variables:planning scale for physical activity.
Independent variables:Self-efficacy scale for physical activity(total score)、Risk perception for inactivity (total score)、Information regarding PA community services.
Controlled variables:Age, Sex(0 = male、1 = female).
VIF:1.038-1.083.

4. Discussion

To our knowledge, this is the first study to date to have investigated planning for PA and related factors among SME workers in Japan. Our findings indicated that higher scores of planning for PA are significantly associated with higher self-efficacy for PA, higher risk perception of inavtivity, and a greater knowledge of information regarding PA community services. The planning scores in this study are similar to those obtained by Amazaki et al. (2014) and by Amazaki et al. (2013a), which were 27.9 ± 9.9 and 30.7 ± 8.9, respectively.

Higher planning is related to higher self-efficacy with regard to PA in workers. Self-efficacy refers to people's beliefs in their capabilities to produce results (Bandura, 1977). Our data indicate that workers with higher self-efficacy for PA perceive themselves as able to perform PA. Furthermore, people with higher self-efficacy strive to improve their lifestyles if they are experiencing difficulties, because these people consider difficulties to be challenges instead (Hata and Doi, 2009). Additionally, the perception that difficulties are surmountable is related to better planning (Zhou et al., 2013; Vinkers et al., 2014). Thus, people with higher self-efficacy do not consider planning for PA as difficult, and are able to control and coordinate their lifestyles in a manner that leads to higher-aimed plans.

Better planning is also related to higher risk perception of inactivity in workers. Risk perception is an individual's own awareness of their health status and risk of diseases (Schwarzer, 1992; Beck and Lund, 1981; Rosenstock, 1966). Higher risk perception of inactivity means that workers are keenly aware of the risks and downsides of not performing PA; they recognize that physical inactivity affects their condition, and they therefore attempt to adjust their present lifestyles. Thus, people with higher risk perception can better predict their futures

and hence strive to avoid risks associated with physical inactivity; this usually involves better planning. Risk perception according to the HAPA can affect intention (Schwarzer, 1992); however, our results indicate that risk perception is also a factor that affects planning. Health management systems are weak and health promotion opportunities are lacking in SMEs. In contrast, in Japan, Industrial Safety and Health Law stipulates that enterprises with > 50 employees must appoint an occupational physician so as to provide their employees with occupational health services (Kubo et al., 2006). Therefore, self-efficacy and risk perception are important, particularly for SME workers who must improve their lifestyles and prevent lifestyle-related diseases at their own initiatives (Kubo et al., 2006).

Higher planning is also related to a greater knowledge of information about community services for PA. In particular, information regarding opportunities and resources has been found to be important for supporting behavior change (Fiechtner et al., 2017). Awareness of information regarding PA community services means having choices available, and possessing more information regarding PA community services increases the number of such choices, and hence increases flexibility regarding performing PA. Therefore, greater awareness of information about community services for PA improves planning capabilities. Low community commitment is a known characteristic of workers in urban areas; they often have to commute for long hours between their residential and work locations. Therefore, at the individual level, it is important for workers to enhance their self-efficacy, risk perception, and access to information regarding PA community services in their daily working life at their workplace. Both health behavior frequency and self-efficacy have been shown to increase with the installment of a self-management program for a general employee population in a workplace setting (Schopp et al., 2015). Additionally, at a group and environmental level, shifting focus from the problems experienced by each middle-aged worker to that of groups consisting of middle-aged workers or SMEs experiencing the same problems, as well as developing an approach for these groups, are considered effective because of group dynamics (Paul-Ebhohimhen and Avenell, 2009). Grouping affects not only individuals but also SMEs and the community, so health practitioners are motivated to attempt connecting each SME. Additionally, enriched transmission of community information is necessary for easy access and availability of information about community services for PA. It is important to consider the environment from which middle-aged workers acquire information.

This study has several limitations. First, it has a cross-sectional design, which meant that causal relationships between planning and each individual related factor could not be identified. Second, measurements were based on a self-administered questionnaire; therefore, response bias was possibly present. Further research is needed.

Conflict of interest

The authors declare that they have no competing interests. Dr. Tadaka is funded by a Japan Society for the Promotion of Science (JSPS) Grant-in-Aid for Scientific Research (No: 21390600; PI: Dr. Etsuko Tadaka). The other authors declare that they have no conflicts of interest related to this study.

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