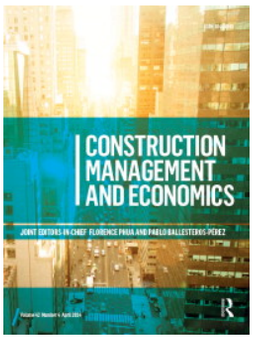

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Workplace bullying and harassment in the Japanese construction industry: prevalence and associations with subjective health and work attractiveness

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ABSTRACT

Workplace bullying and harassment (WBH) at construction sites may impair the well-being of engineers and is thus important for project delivery. This study aimed to assess the prevalence of WBH, examine the cross-sectional associations of WBH with subjective health and work attractiveness, and investigate the moderating effects of project duration and the number of technical personnel on these relationships among a sample of engineers working at construction sites in Japan. Logistic regression analyses were conducted using 5781 responses to the "Questionnaire survey for the reduction of working hours, and fact-finding survey on the attitudes toward life (2021)", to estimate the corresponding odds ratios and 95% confidence intervals. The results indicated an overall prevalence rate of 19.5%. Negative associations of WBH with subjective health and work attractiveness were also demonstrated after adjusting for demographic and occupational characteristics. Additionally, a shorter project duration and a larger number of technical personnel ameliorated the negative association of WBH with work attractiveness. When stratified by gender, similar results were found only among men. These findings suggest that assigning high-risk groups of engineers to projects with shorter durations or a larger number of technical personnel could mitigate the detrimental effects of WBH.

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Workplace bullying and harassment; subjective health; work attractiveness; Japanese construction industry

SUBJECT CLASSIFICATION CODES
construction engineering; project team; health; motivation

Introduction

Workplace bullying and harassment in the construction industry

The construction industry is known for having a high prevalence of work-related stress (Cattell et al. 2017), which is caused by the unique characteristics of construction work. Construction work is project-based, in which a project team or a temporary organization involving multiple stakeholders is formed to fulfill a successful contract (Ness and Green 2012). These stakeholders work together in complicated, ambiguous, and unpredictable situations to attain various goals within the constraints of a given budget, scope, and time frame. These features lead to a wide range of psychosocial work stressors related to job demands, workplace justice, and interpersonal relationships that threaten the well-being of construction personnel (Leung et al. 2015, Chan et al. 2020). Among these stressors, workplace bullying and harassment (WBH) refers to the "systematic display of aggressive behavior and social exclusion at work directed towards a subordinate, a coworker or even a superior, as well as the perception of being systematically exposed to such mistreatment while at work" (Einarsen et al. 2020, p. 6). WBH directly conflicts with the perspective of respect for people based on the principle of human dignity, which is increasingly valued in the construction industry (Emuze 2017).

WBH is considered to be pervasive at construction sites for several reasons. First, masculinity is culturally dominant at construction sites, where achievement and assertiveness are valued more highly than being polite to others (Ness and Green 2012). In such cultural settings, WBH is more likely to be tolerated or even promoted as an effective mode of performance management (Ness and Green 2012, Salin 2021a). Second, power imbalances within the project team could enhance WBH. In these project teams, construction engineers are embedded in relationships with

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their superiors, colleagues, and subordinates, as well as with multiple stakeholders from different organizations, who have different values and potentially conflicting goals (Leung et al. 2015). Such complicated interpersonal networks are likely to entail both formal and informal power imbalances with respect to position, knowledge, and experience; hence, these members might be prone to WBH (Einarsen et al. 2020, Mannix-McNamara 2021). Third, construction projects are often delivered on a tight schedule, which may induce WBH. According to the work environment hypothesis (Leymann 1996), increased time pressure from the project or job demands generally can foster frustration among site-based employees, which may give rise to conditions that are conducive to the development of WBH among these members (Salin and Hoel 2020, Balducci et al. 2021).

There is substantial empirical evidence regarding WBH in general work settings. For instance, previous quantitative studies have examined the antecedents and consequences of WBH using a variety of theoretical models (Branch et al. 2021). Studies that have considered WBH a behavioral outcome of strain resulting from job stressors have identified individual antecedents of WBH victims and perpetrators (e.g. personality, self-esteem, and social competence) as well as organizational antecedents (e.g. role stressors, leadership style, and organizational climate) that may lead to WBH (Zapf and Einarsen 2020, Balducci et al. 2021). Interactions between these individual and organizational factors may explain the development and sustainment of WBH (Branch et al. 2021). Another branch of studies has conceptualized WBH as a job stressor that triggers negative outcomes. WBH has been demonstrated to adversely affect various health-related outcomes (e.g. depression, anxiety, and sleep problems) and work-related outcomes (e.g. sickness absence, presenteeism, and turnover) (Mikkelsen et al. 2020, Conway et al. 2021, Høgh et al. 2021).

Previous studies in the construction industry have examined such detrimental effects of WBH among young construction workers and construction apprentices (Pidd et al. 2017, Ross et al. 2021). Other studies have investigated the negative effects of ethnic- and gender-based harassment and discrimination among various construction professionals, including female construction workers (Goldenhar et al. 1998, Bowen et al. 2013). A recent longitudinal study demonstrated that abusive supervision by site managers weakened the voice of front-line workers (Khan and Khan 2022). However, WBH among site-based employees, especially among engineers working at construction sites, has not been fully explored despite its important role in project delivery (Tijani et al. 2021). Specifically, this study sheds light on the effects of WBH on the subjective health (i.e. one's perception and evaluation of one's own overall health status) and work attractiveness (i.e. the attractiveness of one's profession and current work situation) of engineers due to its importance to both individuals and organizations. For individuals, working in a healthy condition and being attracted to work can be considered crucial for well-being and dignity, which might be undermined by WBH (Emuze 2017). For organizations in the construction industry, the employment and retention of a diverse workforce are becoming pivotal (Pamidimukkala and Kermanshachi 2022), where WBH might be a barrier by adversely affecting the subjective health and work attractiveness of employees, hence causing their turnover (Kivimäki et al. 2008, Björn et al. 2016). In addition, this study focused on the objective characteristics of construction projects as potential moderators of the associations mentioned above. Because incidents of WBH are unlikely to be prevented entirely, it is valuable to explore project characteristics as leverage points to enhance preventive measures against WBH (Courcy et al. 2019); these perspectives are further elaborated upon in the following sections.

The Japanese context

It is also worth highlighting the national culture of Japan because it potentially affects WBH (Giorgi et al. 2013, León-Pérez & Escartín 2021). Japan is characterized by relatively high power distance with respect to Scandinavian countries, which exhibit low power distance; in the Japanese context, an unequal distribution of power and the exercise of power are viewed as ordinary (House et al. 2004, Stone et al. 2020). In such a cultural setting, WBH is likely to be more prevalent (Grimard and Lee 2020). In relation to this point, the Japanese terms for WBH are *ijime* (i.e. bullying) and *pawa-harasumento* (i.e. power harassment). *Pawa-harasumento*, abbreviated as *pawa-hara*, is a Japanese-English term that refers to "verbal or physical behavior that takes advantage of a superior position in a work relationship, harming the workplace environment" (Jain and Torres 2021, p. 315). Since the Act on Comprehensive Promotion of Labour Policies was amended in 2019, employers have been required to take measures to counteract *pawa-hara* (Jain and Torres 2021). Although *pawa-hara* is roughly synonymous with *ijime*, *pawa-hara* emphasizes power

imbalances between the involved parties, where the alleged perpetrators use their superiority in the workplace to cause damage to the victims (Naito 2013). Because, as mentioned above, construction sites are characterized by formal and informal power imbalances in position, knowledge, and experience, in this study, we used *pawa-hara* as a proxy for WBH. We acknowledge that other types of harassment, such as *seku-hara* (i.e. sexual harassment) and *mata-hara* (i.e. maternity harassment), are also aspects of the construct of WBH (Jain and Torres 2021). However, because the Japanese construction industry is characterized by its high power distance and masculine culture, we considered *pawa-hara* as the most pervasive and prominent form of WBH in this context.

Theoretical framework and hypotheses

The adverse effects of WBH can be explained using the job demands–resources (JD-R) model (Demerouti et al. 2001), which posits that all job characteristics can be classified into two broad categories of job demands, which comprise the "physical, psychological, social, or organizational aspects of the job that require sustained physical and/or psychological effort", and job resources, which refer to the "physical, psychological, social, or organizational aspects of the job that are functional in achieving work goals, reduce job demands and the associated physiological and psychological costs, or stimulate personal growth, learning, and development" (Bakker and Demerouti 2017, p. 274). The JD-R model postulates that job demands deplete or exhaust employees' mental and physical resources and energy and hence result in strain (Bakker and Demerouti 2007).

Based on the theoretical assumptions of the JD-R model, WBH can be categorized as one such type of job demand that is considered to deplete and exhaust the resources and energy of engineers who are already working in a mentally and physically demanding environment (Leung et al. 2015, Nielsen et al. 2015). Depletion and exhaustion of resources and energy caused by WBH are then expected to psychologically (e.g. depressive symptoms, anxiety, and suicidal ideation) and physiologically (e.g. sleep disorders, headache, and cardiovascular diseases) damage individuals (Mikkelsen et al. 2020). The subjective health of individuals is expected to include these adversarial effects of WBH on diverse domains of health (Idler and Benyamini 1997).

> Hypothesis 1: WBH is negatively associated with the subjective health of engineers working at construction sites.

Likewise, depletion and exhaustion of resources and energy due to WBH may result in burnout of engineers in terms of emotional exhaustion and depersonalization directly and indirectly through decreased health status, as discussed above (Ribeiro et al. 2022). These reactions indicate that engineers are less attracted to work because they are more likely to leave their jobs (Kim et al. 2019).

> Hypothesis 2: WBH is negatively associated with the work attractiveness of engineers working at construction sites.

Another important assumption of the JD-R model is that job resources buffer the negative effect of job demands on strain (Bakker and Demerouti 2007). Previous studies have identified various organizational and situational factors that attenuate the detrimental effects of WBH on health- and work-related outcomes (Rai and Agarwal 2018). In contrast, limited attention has been given to the objective characteristics of construction projects that provide the context in which engineers are exposed to and respond to WBH (Tuuli 2018, Conway et al. 2021). These project characteristics may moderate the exposure–outcome relationship by potentially functioning as job resources according to the JD-R model. Specifically, this study focused on project duration and the number of technical personnel at the construction site, which have been demonstrated to be important characteristics of construction projects (Mustapha and Naoum 1998).

First, shorter project duration is likely to constitute a job resource in the presence of WBH that moderates its effect (Nielsen et al. 2015). In longer projects, victims of WBH are exposed to a hostile environment for an extended period and undergo a depletion of coping resources that ultimately leads to suicidal ideation (Williams and Nida 2022). In contrast, briefer exposure to WBH in a shorter project may reduce its detrimental effects on health because the coping resources of victims are less likely to be depleted, and psychological, physiological, and social reactions to WBH are less likely to be triggered (Mikkelsen et al. 2020).

Similarly, compared to victims of WBH in a longer project who feel helpless and alienated, victims of shorter projects may appraise the situation involving WBH as more predictable and controllable (Mikkelsen et al. 2020, Williams and Nida 2022), which is likely to ameliorate their turnover intention (Siu and Cooper 1998). Thus, on shorter projects, engineers'

attractiveness to work is anticipated to be less affected by WBH than their counterparts.

Hypothesis 3a: Project duration moderates the association between WBH and subjective health such that the association is weaker for shorter project durations.

Hypothesis 3b: Project duration moderates the association between WBH and work attractiveness such that the association is weaker for shorter project durations.

Second, if more technical personnel are present at the construction site, adversarial relationships with the perpetrators of WBH are likely to occupy smaller portions of the victim's social interaction at work; thus, the coping resources of victims are less likely to be depleted. In addition, victims have more opportunities to seek social support when there is more technical personnel at the construction site, which may ameliorate the detrimental effect of WBH on subjective health (Van den Brande et al. 2021, Farley et al. 2023).

In a similar vein, if victims of WBH are more likely to seek social support due to the greater number of technical personnel present at the construction site, exposure to WBH is merely an isolated incident in an otherwise supportive work environment, hence counteracting the deteriorating effects of WBH on their work attractiveness and turnover intention (Courcy et al. 2019).

Hypothesis 4a: The number of technical personnel moderates the association between WBH and subjective health such that the association is weaker when there are more technical personnel.

Hypothesis 4b: The number of technical personnel moderates the association between WBH and work attractiveness such that the association is weaker when there are more technical personnel.

The purpose of the present study was threefold. First, we aimed to assess the prevalence of WBH in a sample of engineers working at Japanese construction sites. Second, we aimed to examine the cross-sectional associations of WBH with subjective health and work attractiveness. Third, we aimed to investigate the moderating effects of project duration and the number of technical personnel on these relationships.

Methods

Study design and data source

This study is a secondary analysis of the cross-sectional data obtained from the "Questionnaire survey for the reduction of working hours, and fact-finding survey on the attitudes toward life", which is available at the Social Science Japan Data Archive. This annual survey started in 1972 and was conducted by the Council of Japan Construction Industry Employees' Unions, an organization that comprises 35 unions of Japanese construction companies. These companies contain approximately 100 to 20,000 employees, and the union membership rate is generally over 50% (although it varies across companies). The capital of these construction companies ranges from approximately JPY 5 million to JPY 70 billion. These companies act as contractors in most of the projects they are involved in. The aim of the survey is to elucidate the working conditions and work-related attitudes of the union members, who are all white-collar employees. The example questions include items on the amount of overtime work, the reasons for overtime work, and possible measures to reduce overtime work. The present study used data from the survey conducted in November 2021, which included, for the first time, questions on WBH. Of all the members of the employee union or the study population, 16,120 responded to the survey. Ethical approval by an institutional review board was waived for this study because it uses anonymized secondary data that contain no personal information that could be traced back to specific individuals.

Participants

The study participants included all employees who worked as engineers at construction sites during the time the survey was administered. Figure 1 depicts the procedure for participant selection. Of the 16,120 members who responded to the survey, 8087 respondents worked at a construction site. After excluding respondents with at least one missing response for the variables used in the analysis, 5781 respondents remained. These respondents belonged to or were nested in 34 unions, whereas no respondents from one union were included. The respondents in each group were further divided into the architecture department and civil engineering department, which are commonly separated into different departments in Japanese construction firms. Thus, 66 groups in total were included, and the group size ranged from 1 to 393, with an average of 87.6.

Measurement of variables

Outcomes

Subjective health was assessed by asking the following question: "Do you have any concerns about your

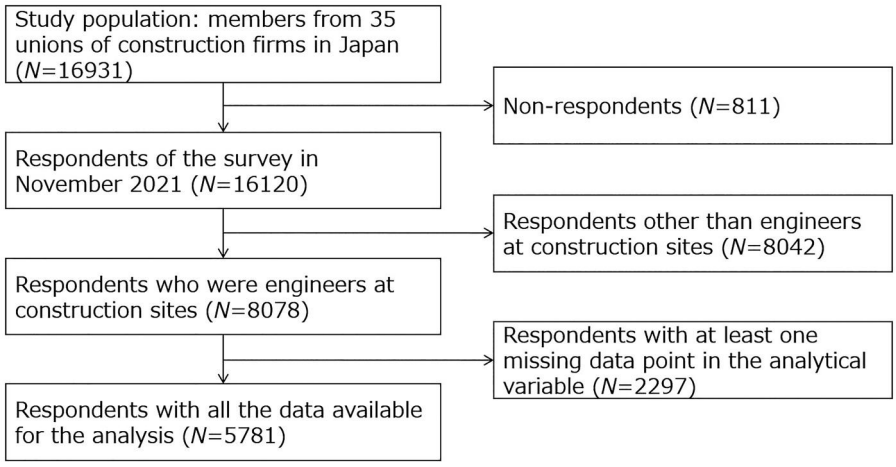

Figure 1. Flow diagram of the participant selection process.

health?" Respondents were asked to choose one of four response options: (1) I have concerns about my physical health, (2) I have concerns about my mental health, (3) I have concerns about both my physical and mental health, or (4) I have no health concerns. A single-item measure of self-rated health is known to function as a reliable predictor of mortality (Idler and Benyamini 1997). Although the mechanisms by which WBH results in physical and mental health problems may differ (Hansen et al. 2021, Høgh et al. 2021), the primary focus of this study was the effect of WBH on overall health status. Thus, the responses were dichotomized into good health (i.e. no concerns) and poor health (i.e. concerns about physical and/or mental health).

Work attractiveness was assessed by asking the following question: "Are you attracted to the current construction industry?" Respondents were asked to choose one of four response options: (1) I am very attracted, (2) I am moderately attracted, (3) I am not very attracted, or (4) I am not attracted at all. The responses were dichotomized into attracted to work (i.e. very attracted or moderately attracted) and not attracted to work (i.e. not very attracted or not attracted at all). A previous study measured affective commitment, a synonymous concept of work attractiveness, using a single item and demonstrated that it has construct validity (Schummer et al. 2019).

Exposures

The present study employed a self-labeling approach to measure the experience of WBH (Gullander et al. 2014). Experience of WBH was assessed by asking the following question: "During the past 3 years, have you been harassed or have you witnessed power harassment?" Respondents were asked to choose one of three response options: (1) I have been harassed, (2) I have witnessed harassment, or (3) I have neither been harassed nor witnessed harassment. The responses were dichotomized into experienced harassment (i.e. having been harassed) and not experienced harassment (i.e. having witnessed harassment or having neither been harassed nor witnessed harassment).

Project duration was measured by asking participants about the starting and completion dates of the most recent project to which they had been assigned. By using the median as a threshold, the responses were dichotomized into "shorter than or equal to 24 months" and "longer than or equal to 25 months."

The number of technical personnel was measured by asking participants how many technical personnel were involved in the most recent project to which they had been assigned. By using the median as a threshold, the responses were dichotomized into "less than or equal to 6 people" and "more than or equal to 7 people."

Covariates

Demographic characteristics (e.g. age, gender, and marital status) and occupational characteristics (e.g. overtime work, occupational class, and teleworking) were also measured in the survey. We incorporated aspects of these measures as covariates from a theoretical perspective (Lee 2014). Specifically, demographic characteristics included gender (men or women) and age group (18–29 years, 30–39 years, 40–49 years, 50–59 years, or 60 years or older). Occupational characteristics included length of overtime work hours during the past month (0–40 hours, 41–60 hours, 61–80 hours, or 81 hours or more) and occupational class (general employee, assistant manager, department head, or others).

Statistical analysis

We first assessed the prevalence rate of WBH by gender, age group, overtime work, and occupational class; the odds ratios (OR) of WBH were also estimated based on these demographic and occupational characteristics. We then conducted multilevel logistic regression analyses to estimate the OR and 95% confidence intervals (CI) of subjective health and work attractiveness.

Because the study participants were nested in the architecture and civil engineering departments of each construction firm, multilevel models were deemed appropriate. Indeed, the intraclass correlation coefficients for subjective health and work attractiveness were 0.012 and 0.021, respectively. Likelihood-ratio tests indicated that between-group variations were not negligible, and the design effects were larger than 2 (Muthen and Satorra 1995). All independent variables were group-mean centered to remove between-group variations because our primary focus was on the cross-sectional associations among individual-level variables (Enders and Tofighi 2007, Yaremych et al. 2023).

Four models were used in the analyses. Initially, the OR for WBH was calculated using a model without any adjustment for covariates (Model 1). Subsequently, demographic and occupational characteristics were added to the model to compute the adjusted OR (Model 2). We further added project duration and the number of technical personnel, which were allowed to interact with WBH (Model 3). Finally, the analysis was stratified by gender (Model 4). Because the individual-level and group-level sample sizes for women were small, multilevel modeling was deemed inappropriate for this final model (Moineddin et al. 2007). Thus, we conducted single-level logistic regression instead and used cluster-robust standard error to account for clustering. Compared with the coefficients obtained from Models 1 to 3, which represent within-group effects, the coefficients obtained from Model 4 represent population-averaged effects.

All statistical analyses were conducted using Stata software (Stata Corp., College Station, TX, USA), version 17.0.

Results

The demographic and occupational characteristics of the engineers are presented in Table 1. The engineers were primarily men (96.1%), and their mean age was 36.9 years (SD = 11.0). Their occupational class was mostly general employees (45.6%), and their average monthly number of overtime work hours was 60.1 hours (SD = 29.7).

In total, 19.5% of engineers experienced WBH. The prevalence rate and OR of WBH by demographic and occupational characteristics are also presented in Table 1. First, although the prevalence rate of WBH was higher for men (19.7%) than women (15.2%), the OR was nonsignificant, indicating no significant difference in the likelihood of occurrence by gender. Second, the odds of experiencing WBH were significantly higher for members of the group aged 30–39 years (OR = 1.24, 95% CI; 1.01–1.53) than for members of the group aged 18–29 years. Third, the odds of experiencing WBH were significantly higher for participants with monthly overtime of 61–80 hours (OR = 1.45, 95% CI; 1.19–1.75) or 81 hours or more (OR = 1.92, 95% CI; 1.56–2.35) than for those with monthly overtime of 40 hours or less. Fourth, the odds of experiencing WBH were significantly lower among participants who occupied the position of department head (OR = 0.65, 95% CI; 0.49–0.87) than among general employees.

Tables 2 and 3 present the results of the analysis of the associations of WBH with subjective health and work attractiveness. According to the crude model without any adjustment for covariates (Model 1), experiencing WBH was significantly and negatively associated with subjective health (OR = 0.36, 95% CI; 0.31–0.41) and work attractiveness (OR = 0.48, 95% CI; 0.42–0.55).

After adjusting for demographic and occupational characteristics (Model 2), the OR for WBH remained significant for both subjective health (OR = 0.36, 95% CI; 0.31–0.42) and work attractiveness (OR = 0.50, 95% CI; 0.44–0.58). These results indicate that being in good health is 0.36 times as likely to occur among those who have been exposed to WBH than among those who have not been exposed to WBH; the same value for being attracted to one's work is 0.50. Thus, Hypotheses 1 and 2 were supported.

After adding the interaction terms (Model 3), the main effects of WBH remained significant for both subjective health (OR = 0.36, 95% CI; 0.31–0.42) and work attractiveness (OR = 0.50, 95% CI; 0.43–0.57). For subjective health, the interaction terms were nonsignificant for both project duration (OR = 1.31, 95% CI; 0.90–1.90) and the number of technical personnel (OR = 0.98, 95% CI; 0.70–1.38). Thus, Hypotheses 3a and 4a were rejected. For work attractiveness, the interaction term was significant for both project duration (OR = 1.72, 95% CI; 1.22–2.42) and the number of technical staff (OR = 1.44, 95% CI; 1.05–1.97). Thus,

Table 1. Demographic and occupational characteristics of study participants and the prevalence of WBH.

	Characteristics		Prevalence	
	n (%)	Mean (SD)	n (%)	OR (95% CI)
Demographic characteristics				
Gender				
Men	5557 (96.1)		1093 (19.7)	1.00 (Reference)
Women	224 (3.9)		34 (15.2)	0.74 (0.50–1.09)
Age		36.9 (11.0)		
18–29 years	2063 (35.7)		405 (19.6)	1.00 (Reference)
30–39 years	1400 (24.2)		319 (22.8)	1.24 (1.01–1.53)
40–49 years	1228 (21.2)		237 (19.3)	1.20 (0.92–1.55)
50–59 years	1064 (18.4)		166 (15.6)	1.02 (0.77–1.36)
60 years or older	26 (0.5)		0 (0.0)	–
Occupational characteristics				
Overtime work		60.1 (29.7)		
40 hours or less	1589 (27.5)		257 (16.2)	1.00 (Reference)
41–60 hours	1778 (30.8)		285 (16.0)	0.95 (0.79–1.15)
61–80 hours	1400 (24.2)		302 (21.6)	1.45 (1.19–1.75)
81 hours or more	1014 (17.5)		283 (27.9)	1.92 (1.56–2.35)
Occupational class				
General employee	2637 (45.6)		537 (20.4)	1.00 (Reference)
Assistant manager	1984 (34.3)		422 (21.3)	0.95 (0.77–1.17)
Department head	1081 (18.7)		151 (14.0)	0.65 (0.49–0.87)
Other	79 (1.4)		17 (21.5)	1.16 (0.67–2.02)

SD: standard deviation.

Hypotheses 3b and 4b were supported. That is, the negative impact of WBH on work attractiveness is weakened when the project duration is shorter (OR = 0.85) and the number of technical staff is larger (OR = 0.72).

Finally, we conducted a stratified analysis by gender (Model 4). Among men, the main effects of WBH were significant for both subjective health (OR = 0.31, 95% CI; 0.22–0.41) and work attractiveness (OR = 0.33, 95% CI; 0.26–0.43) after adjusting for covariates and adding the interaction terms. For subjective health, the interaction term was significant for project duration (OR = 1.32, 95% CI; 1.00–1.75) but nonsignificant for the number of technical personnel (OR = 1.07, 95% CI; 0.75–1.52). For work attractiveness, the interaction terms were significant for both project duration (OR = 1.62, 95% CI; 1.25–2.12) and the number of technical personnel (OR = 1.40, 95% CI; 1.03–1.91).

Among women, the main effects of WBH were nonsignificant for either subjective health (OR = 1.20, 95% CI; 0.17–8.35) or work attractiveness (OR = 0.60, 95% CI; 0.12–2.97) after adjusting for covariates and adding interaction terms. For subjective health, the interaction terms were nonsignificant for both project duration (OR = 0.18, 95% CI; 0.03–1.19) and the number of technical personnel (OR = 0.40, 95% CI; 0.05–3.54). Similarly, for work attractiveness, the interaction terms were nonsignificant for both project duration (OR = 0.62, 95% CI; 0.11–3.38) and the number of technical personnel (OR = 0.72, 95% CI; 0.10–5.11).

Based on the estimates used for Model 4, we present the predicted probabilities of being in good health and being attracted to one's work at different levels of the interaction of WBH and project characteristics, averaged across the observed values for the other covariates (Figures 2 and 3). Although the interaction term was significant, we can see that the difference in the average marginal effect of WBH on subjective health (i.e. the average interaction effect) among men is relatively small (0.057) between different project durations (Figure 2). In contrast, we can observe a larger difference in the average marginal effects of WBH on work attractiveness among men between different project durations (0.114) and between different numbers of technical personnel (0.078) (Figure 3).

Discussion

In the present study, we first assessed the prevalence of WBH among Japanese engineers working at construction sites. We then examined the cross-sectional associations of WBH with subjective health and work attractiveness. Finally, we evaluated the moderating effects of project duration and the number of technical personnel on this association.

To summarize the key results, the OR of WBH differed significantly by demographic characteristics (i.e. age group) and occupational characteristics (i.e. number of overtime work hours and occupational class). More specifically, members of the group aged 30–39 years were significantly more likely to experience WBH than members of the group aged 18–29 years, participants who worked 61–80 hours or 81 hours or more

Table 2. Association of WBH with subjective health and the moderating effect of project characteristics.

	Odds ratio (95% confidence interval)				
	Model 1[a]	Model 2[b]	Model 3[b]	Model 4[c]	
				Men	Women
Fixed effect					
WBH					
Not experienced	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Experienced	0.36 (0.31–0.41)	0.36 (0.31–0.42)	0.36 (0.31–0.42)	0.31 (0.22–0.41)	1.20 (0.17–8.35)
Project duration					
$\geq$ 25 months			1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
$\leq$ 24 months			0.97 (0.85–1.11)	0.90 (0.79–1.02)	0.66 (0.37–1.18)
Number of technical personnel					
$\leq$ 6 people			1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
$\geq$ 7 people			0.97 (0.86–1.10)	0.99 (0.88–1.12)	1.19 (0.67–2.10)
Interaction					
WBH $\times$ project duration			1.31 (0.90–1.90)	1.32 (1.00–1.75)	0.18 (0.03–1.19)
WBH $\times$ number of technical personnel			0.98 (0.70–1.38)	1.07 (0.75–1.52)	0.40 (0.05–3.54)
Gender					
Men		1.00 (Reference)	1.00 (Reference)		
Women		0.91 (0.68–1.21)	0.91 (0.68–1.21)		
Age					
18–29 years		1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
30–39 years		0.75 (0.63–0.90)	0.75 (0.63–0.90)	0.73 (0.59–0.90)	0.39 (0.13–1.18)
40–49 years		0.60 (0.48–0.75)	0.60 (0.48–0.75)	0.57 (0.44–0.72)	0.35 (0.00–31.2)
50–59 years		0.45 (0.35–0.57)	0.44 (0.35–0.56)	0.41 (0.31–0.55)	–
60 years or older		0.30 (0.13–0.73)	0.31 (0.13–0.73)	0.27 (0.11–0.67)	–
Overtime work					
40 hours or less		1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
41–60 hours		0.85 (0.74–0.98)	0.85 (0.74–0.98)	0.87 (0.75–1.00)	0.89 (0.42–1.86)
61–80 hours		0.71 (0.61–0.83)	0.71 (0.61–0.84)	0.73 (0.64–0.84)	0.53 (0.27–1.04)
81 hours or more		0.41 (0.34–0.49)	0.41 (0.34–0.49)	0.40 (0.34–0.47)	0.66 (0.30–1.47)
Occupational class					
General employee		1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Assistant manager		0.86 (0.72–1.03)	0.86 (0.72–1.03)	0.89 (0.74–1.07)	3.71 (0.52–26.3)
Department head		0.97 (0.77–1.22)	0.98 (0.77–1.23)	1.06 (0.84–1.33)	–
Other		0.66 (0.41–1.06)	0.66 (0.41–1.06)	0.62 (0.36–1.06)	1.15 (0.41–3.21)
Intercept	0.75 (0.69–0.81)	0.74 (0.68–0.80)	0.74 (0.67–0.80)	1.94 (1.57–2.39)	1.77 (0.86–3.64)
Random effect[d]					
Group-level intercept	0.046 (0.018)	0.051 (0.020)	0.051 (0.020)	–	–

[a]Without any adjustment for covariates.
[b]Adjusted for demographic and occupational characteristics (gender, age group, overtime work, and position).
[c]Adjusted for demographic and occupational characteristics (age group, overtime work, and position); stratified by gender.
[d]Variance and standard error.

had significantly higher odds of experiencing WBH than participants with monthly overtime of 40 hours or less, and participants in the position of department head had significantly lower odds of experiencing WBH than general employees.

In terms of exposure, WBH was significantly and negatively associated with subjective health and work attractiveness after adjusting for demographic and occupational characteristics. Additionally, a shorter project duration and a larger number of technical personnel ameliorated the negative association of WBH with work attractiveness. When stratified by gender, the main effects of WBH and interaction effects of WBH with project characteristics were found only among men.

Interpretations

The present study found that the prevalence rate of WBH among engineers working at construction sites in Japan was 19.5%. Previous studies using the self-labeling approach have reported varying levels of the prevalence rate of WBH. In their study of construction industry apprentices in Australia, Ross et al. (2021) found that 30.8% of such apprentices reported the presence of bullying during the last six months. Among Japanese workers, Tsuno et al. (2015) found that 6.1% personally experienced bullying during the past 30 days. Giorgi et al. (2013) found that 10.4% of union members in Japan were occasionally bullied, while 5.2% were regularly bullied. Therefore, the prevalence rate of WBH among engineers working in the Japanese construction industry may be higher than among Japanese workers in general, and WBH may be even more prevalent among blue-collar workers in the construction industry (Mendonca and D'Cruz 2021). However, caution remains necessary with regard to directly comparing the prevalence rates reported by different studies (Salin 2021a).

Table 3. Association of WBH with work attractiveness and the moderating effect of project characteristics.

	Odds ratio (95% confidence interval)				
	Model 1[a]	Model 2[b]	Model 3[b]	Model 4[c]	
				Men	Women
Fixed effect					
WBH					
Not experienced	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Experienced	0.48 (0.42–0.55)	0.50 (0.44–0.58)	0.50 (0.43–0.57)	0.33 (0.26–0.43)	0.60 (0.12–2.97)
Project duration					
$\geq$ 25 months			1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
$\leq$ 24 months			1.02 (0.90–1.16)	0.88 (0.76–1.02)	0.80 (0.41–1.55)
Number of technical personnel					
$\leq$ 6 people			1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
$\geq$ 7 people			1.15 (1.02–1.30)	1.09 (0.95–1.25)	0.91 (0.43–1.91)
Interaction					
WBH $\times$ project duration			1.72 (1.22–2.42)	1.62 (1.25–2.12)	0.62 (0.11–3.38)
WBH $\times$ number of technical personnel			1.44 (1.05–1.97)	1.40 (1.03–1.91)	0.72 (0.10–5.11)
Gender					
Men		1.00 (Reference)	1.00 (Reference)		
Women		1.61 (1.19–2.16)	1.60 (1.19–2.16)		
Age					
18–29 years		1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
30–39 years		1.09 (0.92–1.30)	1.09 (0.92–1.30)	1.06 (0.83–1.36)	0.96 (0.29–3.23)
40–49 years		1.23 (0.99–1.53)	1.21 (0.98–1.51)	1.14 (0.86–1.52)	0.66 (0.01–37.1)
50–59 years		1.04 (0.82–1.31)	1.02 (0.81–1.29)	0.95 (0.70–1.28)	–
60 years or older		0.68 (0.30–1.55)	0.67 (0.29–1.52)	0.51 (0.18–1.45)	–
Overtime work					
40 hours or less		1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
41–60 hours		0.85 (0.73–0.98)	0.84 (0.73–0.97)	0.85 (0.74–0.96)	0.82 (0.43–1.57)
61–80 hours		0.80 (0.69–0.94)	0.79 (0.68–0.92)	0.82 (0.71–0.94)	0.68 (0.33–1.44)
81 hours or more		0.55 (0.47–0.66)	0.55 (0.46–0.65)	0.56 (0.48–0.66)	0.36 (0.15–0.89)
Occupational class					
General employee		1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Assistant manager		0.81 (0.68–0.97)	0.82 (0.68–0.97)	0.82 (0.67–1.01)	4.47 (0.88–22.7)
Department head		0.91 (0.72–1.14)	0.94 (0.75–1.18)	1.01 (0.78–1.30)	–
Other		0.69 (0.43–1.09)	0.69 (0.43–1.09)	0.77 (0.51–1.16)	0.30 (0.07–1.35)
Intercept	1.10 (1.01–1.21)	1.10 (1.00–1.22)	1.10 (1.00–1.21)	1.69 (1.34–2.12)	3.44 (1.96–6.05)
Random effect[d]					
Group-level intercept	0.073 (0.024)	0.076 (0.025)	0.075 (0.025)	–	–

[a]Without any adjustment for covariates.
[b]Adjusted for demographic and occupational characteristics (gender, age group, overtime work, and position).
[c]Adjusted for demographic and occupational characteristics (age group, overtime work, and position); stratified by gender.
[d]Variance and standard error.

Concerning the OR of WBH by demographic characteristics, first, this study found no significant difference in the likelihood of occurrence by gender. Although this finding is in line with previous studies that have reported no significant difference by gender in this context (Tsuno et al. 2015), this result warrants further consideration. Generally, men are less likely to label their experience as WBH than women (Salin 2021b). The reason for this potential underreporting is that admitting to being a victim of WBH entails a feeling of shame and threatens their self-esteem (Nielsen et al. 2011). Moreover, underreporting by men is more likely in a masculine culture in which admitting to suffering distress, which may be due to WBH, is viewed as a sign of weakness (Leung et al. 2015); the Japanese construction industry represents one such culture. Therefore, the results regarding gender differences in prevalence must be interpreted cautiously. Second, this study found that participants aged 30–39 years had significantly higher odds of experiencing WBH than those aged 18–29 years. The result is inconsistent with the finding of a previous study that reported that younger employees (under the age of 30 years) were more likely to experience bullying than employees who were 50 years or older (Tsuno et al. 2015). In Japanese companies that feature a lifetime employment system, seniority usually represents power allocation, where young employees with less power are likely to face higher risks of becoming the target of WBH. However, because of the higher rate of turnover among employees who are 18–29 years old and the recent upholding of policies against *pawahara* (Jain and Torres 2021, Ministry of Health, Labour and Welfare 2021), potential perpetrators might refrain from targeting individuals who are 18–29 years old. Instead, individuals who are 30–39 years old might newly emerge as vulnerable targets of WBH.

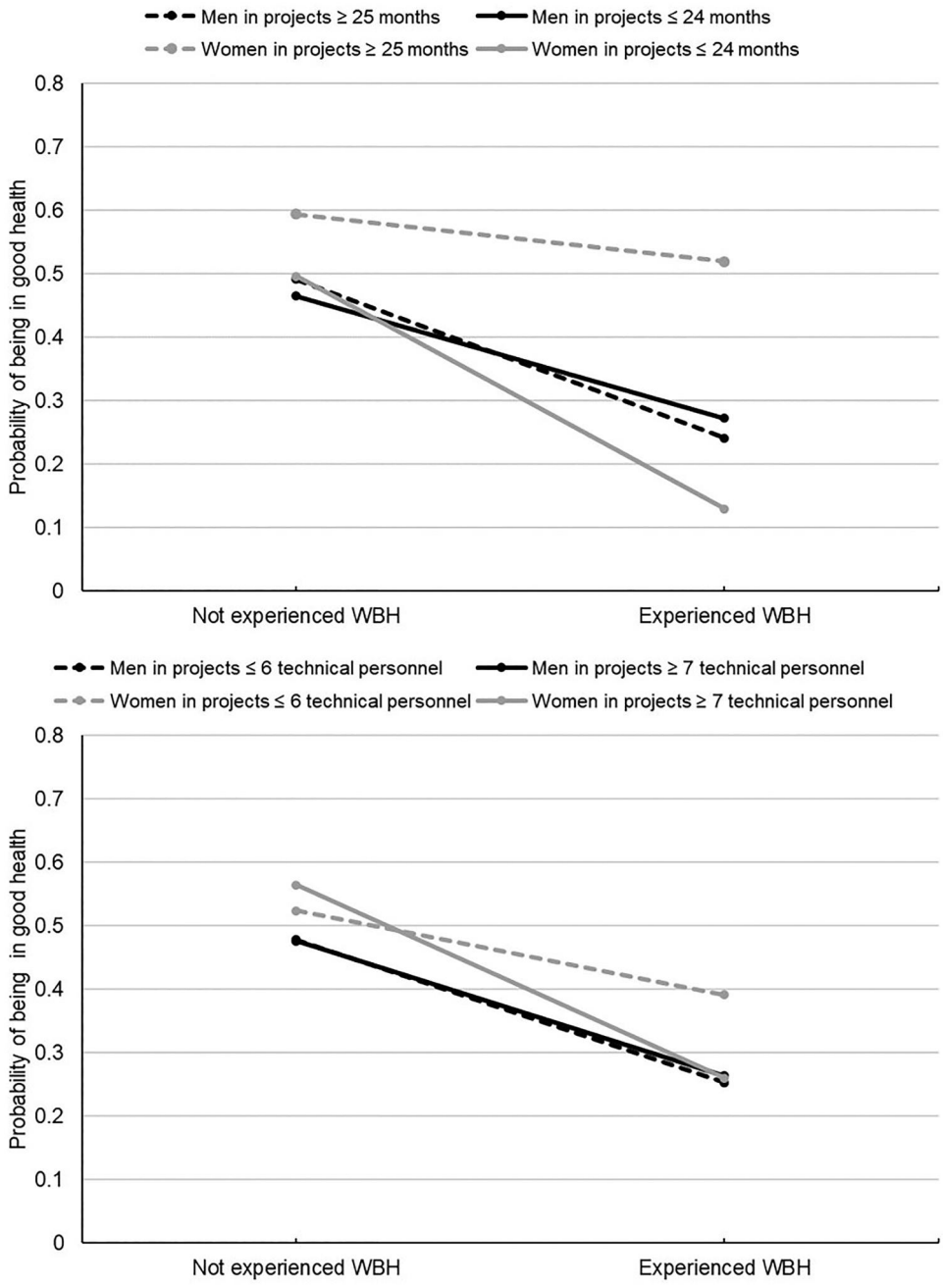

Figure 2. Average predicted probability of being in good health at different levels of the interaction between WBH and project characteristics.

Concerning the OR of WBH by occupational characteristics, first, this study found that participants who worked 61–80 hours or 81 hours or more had significantly higher odds of experiencing WBH than those who worked 40 hours or less of overtime. This result could be explained by reference to the work environment hypothesis, which posits that work-related stressors in a poor work environment give rise to conditions that are conducive to the development of WBH (Leymann 1996). Specifically, the distress caused by long working hours may lead to provocative acts on the part of potential victims, which, in turn, trigger WBH from perpetrators as a form of retaliation (Balducci et al. 2021). In addition, longer working hours may increase the frequency with which potential victims interact socially with their superiors, colleagues, and subordinates, and thus increase the risk of experiencing WBH. Second, our study found significantly lower odds of experiencing WBH among individuals who occupied the position of department head than among general employees. The individual's occupational class is a representation of their power

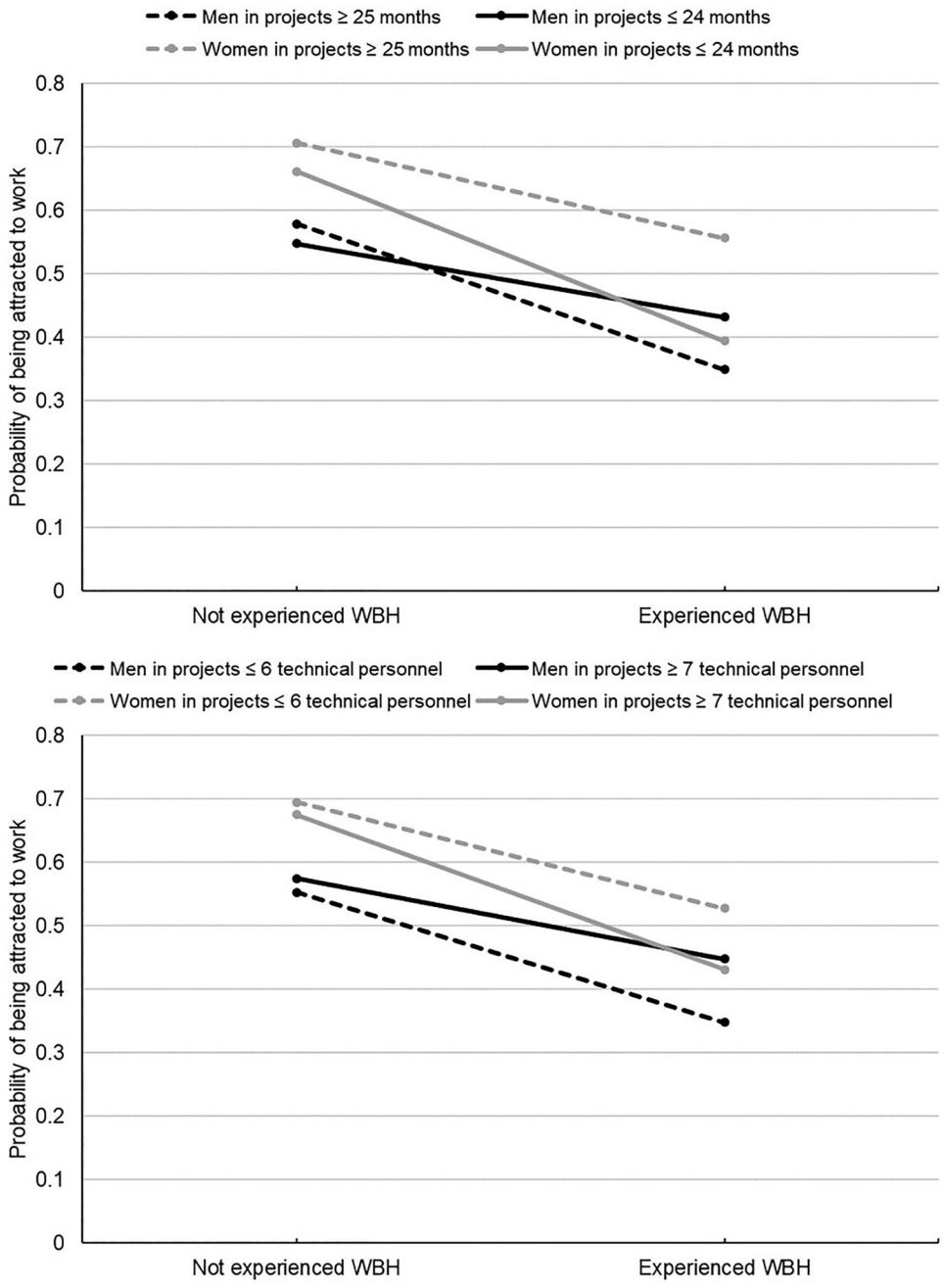

Figure 3. Average predicted probability of being attracted to one's work at different levels of the interaction between WBH and project characteristics.

within the organization. Thus, engineers who occupy the position of department head are less likely to experience WBH than general employees, especially regarding *pawa-hara*, which arises from one's superiority over another in the workplace.

We also demonstrated that exposure to WBH was significantly associated with decreased subjective health and work attractiveness after adjusting for demographic and occupational characteristics. These results are comparable to the findings of extant meta-analyses, which have reported that workplace bullying is associated with both health-related outcomes (e.g. depression, anxiety, and sleep problems) and work-related outcomes (e.g. sickness absence, presenteeism, and turnover) (Mikkelsen et al. 2020, Conway et al. 2021, Høgh et al. 2021). This study confirmed that WBH has detrimental effects on subjective health and work attractiveness among engineers working at Japanese construction sites, similar to what occurs in general work settings, even though WBH is more likely to be tolerated or even promoted as an effective mode of performance management at construction

sites and in the Japanese cultural context where an unequal distribution of power and the exercise of power are viewed as ordinary (House et al. 2004, Ness and Green 2012, Stone et al. 2020, Salin 2021a).

In addition, this study examined the moderating effect of project characteristics in this context. Specifically, a shorter project duration and a larger number of technical personnel ameliorated the negative association of WBH with work attractiveness. It is likely that when the project duration is shorter, even exposure to WBH may not completely deplete the coping resources of the victims. In such cases, the victims may feel that the situation is more predictable and controllable, and they may thus be able to maintain their motivation at work. When more technical personnel are present at the construction site, victims may have more opportunities to seek social support, thus being able to defend themselves from the loss of attractiveness at work. By contrast, project characteristics had no modifying effect on the association of WBH with subjective health. The negative impact of exposure to WBH on health-related outcomes is possibly more acute (Nielsen et al. 2021), cumulative (Berry et al. 2016), and irreversible (Cheung et al. 2018); hence, this impact is more difficult to mitigate than the effect of WBH on work-related outcomes. These findings imply that project characteristics are an emergent aspect of job resources in the JD-R model that may be a proximal influence in project-based work settings. In particular, project duration and the number of technical personnel may function as job resources for specific outcomes, including work attractiveness. Additional studies are warranted to examine the association between such job resources and various health- and work-related outcomes. These attempts could further elucidate the conditions under which project characteristics serve as job resources.

Regarding the gender-stratified analysis, it is worth highlighting the fact that similar results were not observed among women. There are several possible explanations for this gender difference. From a methodological perspective, the number of female participants was small, and given the number of variables and the complexity of the model, this situation could have enlarged the CI of the estimates. From a theoretical perspective, women are more likely to label their experience as WBH than men, as we have already discussed (Salin 2021b). Therefore, among individuals who reported being exposed to WBH via the self-labeling approach, women might experience negative behaviors that are less severe than those experienced by men. In addition, we must consider differences in the forms of bullying and harassment to which men and women are subjected (Salin 2021b). Although this study focused on *pawa-hara*, female workers in the construction industry frequently experience sexual harassment (Goldenhar et al. 1998). Indeed, *seku-hara* is juxtaposed with *pawa-hara* in the Japanese legislative context because they often occur together in the real world (Raver and Nishii 2010, Jain and Torres 2021). Thus, it would be beneficial for future studies to investigate various forms of bullying and harassment simultaneously, especially with respect to gender differences.

Implications

This study showed that although WBH is negatively associated with both subjective health and work attractiveness, a shorter project duration and a larger number of technical personnel attenuated its association with work attractiveness, especially among men. From a theoretical perspective, these findings identify the conditions under which the negative effect of WBH on work attractiveness is less severe and thus increase our understanding of the theoretical mechanism linking exposure to WBH, its outcomes, and contextual factors (i.e. project characteristics). These findings also indicate that project characteristics may be categorized as job resources according to the JD-R model, where future studies could benefit from exploring the moderating effects of other project characteristics, such as project type and project complexity (Tuuli 2018), to verify and extend our current understanding of the theoretical mechanisms involving WBH in project-based work settings.

From a practical perspective, these findings could help develop preventive measures for WBH by considering project characteristics as job resources that organizations can manage. Although it is impractical to directly redesign construction projects that are usually specified and fixed, an effective (re)arrangement of the project team could be a form of secondary prevention or to mitigate the harm caused by WBH (Barling et al. 2005). For example, assigning engineers at greater risk of WBH to projects with potential job resources (i.e. shorter duration or more technical personnel) would be useful. Intense monitoring of WBH could be an alternative effective measure for projects with a possible lack of job resources (i.e. longer duration or fewer technical personnel); this could provide tertiary prevention aimed at promptly remedying adverse outcomes induced by WBH (Barling et al. 2005). These secondary and tertiary preventive

measures may be more critical in countries with high power distance and masculine culture, such as Japan, where WBH is likely to be pervasive; thus, there is a need to complement primary prevention (Zapf and Vartia 2020). It is recommended that future studies examine whether these various measures of WBH simultaneously enhance individual performance and improve organizational outcomes.

Limitations

The present study has several limitations. First, this study remains inconclusive regarding how and why a gender difference emerged in its results. Previous theoretical and empirical studies have suggested that men and women exhibit general differences regarding their risk of being subject to, sense-making regarding, and responses to WBH (Salin 2021b). These differences are ascribed to the gendered context in which WBH occurs (Salin 2021b). In the construction industry, previous studies have noted that female workers develop their careers while occupying particular cultural niches that are different from those associated with the dominant masculine culture (Gale 1994, Dainty et al. 2001, French and Strachan 2017). These contextual factors are difficult to include in the model due to the limited number of female participants in most of the survey data. Therefore, future studies could employ a qualitative method to explore the contexts in which WBH occurs. These attempts may lead to gender-specific interventions aimed at preventing the occurrence of and mitigating the adverse effects of WBH at construction sites.

Second, this study used a self-labeling approach to measure experiences of WBH or *pawa-hara* in particular. Although this method is easy to employ and reduces the burden on the respondents, some drawbacks must be addressed. Of particular importance is the possible discrepancy between the academic definition of WBH and the respondents' personal definitions of the term, which can be more notable if the item does not include a preceding description (Nielsen et al. 2011). Indeed, a previous meta-analysis indicated that using the self-labeling method without a prior definition of the term yields a higher prevalence of bullying (Nielsen et al. 2010). Alongside the fact that a longer time span was employed (i.e. 3 years) than the commonly used 6 months (Leymann 1990), this study might overestimate the prevalence of WBH (Notelaers and Van Der Heijden 2021). Future studies using the self-labeling approach could incorporate a brief definition of WBH to address this problem. In addition, the behavioral experience approach could be employed simultaneously by presenting respondents with a validated inventory such as the Negative Acts Questionnaire-Revised (NAQ-R) (Einarsen et al. 2009, Tsuno et al. 2010). Integrating the self-labeling approach and behavioral experience approach could improve the study's validity further (Nielsen et al. 2011, Nielsen et al. 2020).

Third, another potential limitation of the measurement method should be noted. Single-item questions were used to measure the exposure and outcomes, including WBH, subjective health, and work attractiveness, mainly because this was a secondary analysis, and thus the available data were limited. Single-item measures may have limited validity compared with multi-item measures, which are usually more valid and reliable (DeVellis and Thorpe 2022). Therefore, future studies are recommended to use validated multi-item instruments, such as the NAQ-R (Einarsen et al. 2009, Tsuno et al. 2010) and the Kessler Psychological Distress Scale (K6) (Furukawa et al. 2008, Kessler et al. 2002) to measure the relevant constructs.

Fourth, we dichotomized the health outcome measure into good and poor health without differentiating physical and mental health because our primary interest was the adverse effect of WBH on overall health status. Moreover, a single-item measure was used with response options that were not mutually exclusive (e.g. "I have concerns about both physical and mental health"); therefore, it was not practically possible to differentiate physical and mental health. However, previous studies have identified multiple mechanisms by which WBH has various adverse effects on health (Hansen et al. 2021, Høgh et al. 2021). These findings suggest that there may be differences in the size and speed of the detrimental effect of WBH on physical and mental health. These differences would be worth investigating in future research.

Fifth, although the present study examined the nested structure of data at the organizational level, its primary focus was on the associations among the individual-level variables, including project characteristics as individual-level moderators. However, project characteristics are common to site engineers assigned to the same projects, and thus are project-level variables. Therefore, future researchers should consider additionally collecting project identifiers as data, which would permit the examination of the cross-level interaction effect between project characteristics and individual experience of WBH on health- and work-related outcomes.

Finally, because this study used a cross-sectional design, causal relationships must be interpreted carefully. In particular, we cannot rule out the possibility of reverse causation. That is, employees with poor subjective health might be more likely to categorize their experiences as WBH (Conway et al. 2021). Several explanations could account for this mechanism. One such explanation is that employees with poor health conditions are less able to tolerate negative behaviors and are more likely to interpret these behaviors as WBH (Nielsen et al. 2015). Another explanation is that employees with poor health conditions may act in a way that triggers hostile reactions from others (Nielsen et al. 2015). Future research could employ a prospective design to overcome this issue while controlling for baseline health conditions.

Conclusion

In conclusion, the present study assessed the prevalence of WBH among Japanese engineers working at construction sites. This study also identified the negative association of WBH with subjective health and work attractiveness after adjusting for demographic and occupational characteristics. Additionally, a shorter project duration and a larger number of technical personnel ameliorated the negative association of WBH with work attractiveness. When stratified by gender, similar results were found only among men. These findings suggest that engineers who face higher risks of WBH could be assigned to projects with shorter durations or a larger number of technical personnel to mitigate the detrimental effects of WBH. It would be beneficial for future studies to employ a prospective design with an integrated measurement of WBH. An explorative study on the gendered context of WBH is also warranted to explain potential gender differences with regard to the relationships of WBH with its antecedents, consequences, and moderators.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Data availability statement

The data that support the findings of this study are available at the Social Science Japan Data Archive.

References

Bakker, A.B., and Demerouti, E., 2007. The job demands-resources model: state of the art. *Journal of Managerial Psychology*, 22 (3), 309–328.

Bakker, A.B., and Demerouti, E., 2017. Job demands–resources theory: taking stock and looking forward. *Journal of Occupational Health Psychology*, 22 (3), 273–285.

Balducci, C., Conway, P. M., and Van Hougten, K., 2021. The contribution of organizational factors to workplace bullying, emotional abuse and harassment. *In*: P. D'Cruz, E. Noronha, E. Baillien, B. Catley, K. Harlos, A. Høgh, and E.G. Mikkelsen, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 2), Pathways of job-related negative behavior*. Singapore: Springer, 3–28.

Barling, J., Kelloway, E. K., and Frone, M. R., 2005. Editor's overview: interventions. *In*: J. Barling, E.K. Kelloway, and M.R. Frone, eds. *Handbook of work stress*. Thousand Oaks, CA: Sage, 603–605.

Berry, P.A., *et al.*, 2016. Psychological distress and workplace bullying among registered nurses. *Online Journal of Issues in Nursing*, 21 (3), 8.

Björn, C., Lindberg, M., and Rissén, D., 2016. Significant factors for work attractiveness and how these differ from the current work situation among operating department nurses. *Journal of Clinical Nursing*, 25, 109–116.

Bowen, P., Edwards, P., and Lingard, H., 2013. Workplace stress among construction professionals in South Africa. *Engineering, Construction and Architectural Management*, 20 (6), 620–635.

Branch, S., *et al.*, 2021. Theoretical frameworks that have explained workplace bullying: retracing contributions across the decades. *In*: P. D'Cruz, E. Noronha, G. Notelaers, and C. Rayner, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 1), concepts, approaches and methods*. Singapore: Springer, 87–130.

Cattell, K. S., *et al.*, 2017. *The state of well-being in the construction industry*. Bracknell: The Chartered Institute of Building.

Chan, A.P., Nwaogu, J.M., and Naslund, J.A., 2020. Mental ill-health risk factors in the construction industry: systematic review. *Journal of Construction Engineering and Management*, 146 (3), 04020004.

Cheung, T., Lee, P.H., and Yip, P.S., 2018. The association between workplace violence and physicians' and nurses' job satisfaction in Macau. *PLoS One*, 13 (12), e0207577.

Conway, P. M., *et al.*, 2021. Workplace bullying and mental health. *In*: P. D'Cruz, E. Noronha, E. Baillien, B. Catley, K. Harlos, A. Høgh, and E.G. Mikkelsen, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 2), pathways of job-related negative behavior*. Singapore: Springer, 101–128.

Courcy, F., Morin, A.J.S., and Madore, I., 2019. The effects of exposure to psychological violence in the workplace on commitment and turnover intentions: the moderating role of social support and role stressors. *Journal of Interpersonal Violence*, 34 (19), 4162–4190.

Dainty, A.R., Bagilhole, B.M., and Neale, R.H., 2001. Male and female perspectives on equality measures for the UK construction sector. *Women in Management Review*, 16 (6), 297–304.

Demerouti, E., *et al.*, 2001. The job demands–resources model of burnout. *Journal of Applied Psychology*, 86 (3), 499–512.

DeVellis, R. F., and Thorpe, C. T., 2022. *Scale development: theory and applications*. Thousand Oaks, CA: Sage.

Einarsen, S. V., *et al.*, 2020. The concept of bullying and harassment at work: the European tradition. *In*: S.V. Einarsen, H. Hoel, D. Zapf, and C.L. Cooper, eds. *Bullying and harassment in the workplace: theory, research and practice*. 3rd ed. Boca Raton, FL: CRC Press, 3–53.

Einarsen, S., Hoel, H., and Notelaers, G., 2009. Measuring exposure to bullying and harassment at work: validity, factor structure and psychometric properties of the Negative Acts Questionnaire-Revised. *Work & Stress*, 23 (1), 24–44.

Emuze, F., 2017. People in construction: who they are, why we need them, and how to treat them. *In*: F. Emuze and J. Smallwood, eds. *Valuing people in construction*. London, UK: Routledge, 3–22.

Enders, C.K., and Tofighi, D., 2007. Centering predictor variables in cross-sectional multilevel models: a new look at an old issue. *Psychological Methods*, 12 (2), 121–138.

Farley, S., *et al.*, 2023. What influences the relationship between workplace bullying and employee well-being? A systematic review of moderators. *Work & Stress*, 37 (3), 345–372.

French, E., and Strachan, G., 2017. Women in the construction industry: still the outsiders. *In*: F. Emuze and J. Smallwood, eds. *Valuing people in construction*. London, UK: Routledge, 151–171.

Furukawa, T.A., *et al.*, 2008. The performance of the Japanese version of the K6 and K10 in the World Mental Health Survey Japan. *International Journal of Methods in Psychiatric Research*, 17 (3), 152–158.

Gale, A.W., 1994. Women in non-traditional occupations: the construction industry. *Women in Management Review*, 9 (2), 3–14.

Giorgi, G., *et al.*, 2013. Exploring personal and organizational determinants of workplace bullying and its prevalence in a Japanese sample. *Psychology of Violence*, 3 (2), 185–197.

Goldenhar, L.M., *et al.*, 1998. Stressors and adverse outcomes for female construction workers. *Journal of Occupational Health Psychology*, 3 (1), 19–32.

Grimard, C. M., and Lee, R. T., 2020. Cross-cultural perspectives of workplace bullying. *In*: S.V. Einarsen, H. Hoel, D. Zapf, and C.L. Cooper, eds. *Bullying and harassment in the workplace: theory, research and practice*. 3rd ed. Boca Raton, FL: CRC Press, 435–454.

Gullander, M., *et al.*, 2014. Exposure to workplace bullying and risk of depression. *Journal of Occupational and Environmental Medicine*, 56 (12), 1258–1265.

Hansen, Å. M., *et al.*, 2021. Health consequences of workplace bullying: physiological responses and sleep as pathways to disease. *In*: P. D'Cruz, E. Noronha, E. Baillien, B. Catley, K. Harlos, A. Høgh, and E.G. Mikkelsen, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 2), pathways of job-related negative behavior*. Singapore: Springer, 129–152.

Høgh, A., *et al.*, 2021. Consequences of workplace bullying for individuals, organizations and society. *In*: P. D'Cruz, E. Noronha, E. Baillien, B. Catley, K. Harlos, A. Høgh, and E.G. Mikkelsen, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 2), pathways of job-related negative behavior*. Singapore: Springer, 177–200.

House, R. J., *et al.*, 2004. *Culture, leadership, and organizations: the GLOBE study of 62 societies*. Thousand Oaks, CA: Sage.

Idler, E.L., and Benyamini, Y., 1997. Self-rated health and mortality: a review of twenty-seven community studies. *Journal of Health and Social Behavior*, 38, 21–37.

Jain, A., and Torres, L., 2021. Workplace bullying in Asia: an examination of the policy context in the region. *In*: P. D'Cruz, E. Noronha, and A. Mendonca, eds. *Asian perspectives on workplace bullying and harassment*. Singapore: Springer, 305–331.

Kessler, R.C., *et al.*, 2002. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, 32 (6), 959–976.

Khan, N.A., and Khan, A.N., 2022. Exploring the impact of abusive supervision on employee' voice behavior in Chinese construction industry: a moderated mediation analysis. *Engineering, Construction and Architectural Management*, 29 (8), 3051–3071.

Kim, Y., Lee, E., and Lee, H., 2019. Association between workplace bullying and burnout, professional quality of life, and turnover intention among clinical nurses. *PLoS One*, 14 (12), e0226506.

Kivimäki, M., *et al.*, 2008. Low medically certified sickness absence among employees with poor health status predicts future health improvement: the Whitehall II study. *Occupational and Environmental Medicine*, 65, 208–210.

Lee, P.H., 2014. Should we adjust for a confounder if empirical and theoretical criteria yield contradictory results? A simulation study. *Scientific Reports*, 4 (1), 1–14.

León-Pérez, J. M., and Escartín, J.G.G., 2021. The presence of workplace bullying and harassment worldwide. *In*: P. D'Cruz, E. Noronha, G. Notelaers, and C. Rayner, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 1), concepts, approaches and methods*. Singapore: Springer, 55–86.

Leung, M.-Y., Chan, I. Y. S., and Cooper, C. L., 2015. *Stress management in the construction industry*, Chichester, UK: John Wiley & Sons.

Leymann, H., 1990. Mobbing and psychological terror at workplaces. *Violence and Victims*, 5 (2), 119–126.

Leymann, H., 1996. The content and development of mobbing at work. *European Journal of Work and Organizational Psychology*, 5 (2), 165–184.

Mannix-McNamara, P., 2021. The contested terrain of power in workplace bullying. *In*: P. D'Cruz, E. Noronha, E. Baillien, B. Catley, K. Harlos, A. Høgh, and E.G. Mikkelsen, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 2), pathways of job-related negative behavior*. Singapore: Springer, 49–72.

Mendonca, A., and D'Cruz, P., 2021. Workplace bullying, emotional abuse and harassment in the context of dirty work. *In*: P. D'Cruz, E. Noronha, L. Keashy, and S. Tye-Williams, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 4), special topics and particular occupations, professions and sectors*. Singapore: Springer, 551–586.

Mikkelsen, E. G., *et al.*, 2020. Individual consequences of being exposed to workplace bullying. *In*: S.V. Einarsen, H. Hoel, D. Zapf, and C.L. Cooper, eds. *Bullying and*

harassment in the workplace: theory, research and practice. 3rd ed. Boca Raton, FL: CRC press, 163–208.

Ministry of Health, Labour and Welfare, 2021. *Survey on employment trends* [online]. Available from: https://www.mhlw.go.jp/toukei/itiran/roudou/koyou/doukou/22-2/index.html [Accessed 2023].

Moineddin, R., Matheson, F.I., and Glazier, R.H., 2007. A simulation study of sample size for multilevel logistic regression models. *BMC Medical Research Methodology*, 7, 34.

Mustapha, F., and Naoum, S., 1998. Factors influencing the effectiveness of construction site managers. *International Journal of Project Management*, 16 (1), 1–8.

Muthen, B.O., and Satorra, A., 1995. Complex sample data in structural equation modeling. *Sociological Methodology*, 25, 267–316.

Naito, S., 2013. Workplace bullying in Japan. The Japan Institute for Labour Policy and Training. *In Workplace bullying and harassment, JILPT report No. 12*. Tokyo, Japan: The Japan Institute for Labour Policy and Training, 113–133.

Ness, K., and Green, S., 2012. Human resource management in the construction context: disappearing workers in the UK. *In*: A. Dainty and M. Loosemore, eds. *Human resource management in construction: critical perspectives*. New York, NY: Routledge, 18–50.

Nielsen, M. B., *et al*., 2015. Exposure to aggression in the workplace. *In*: S. Clarke, T.M. Probst, F. Guldenmund, and J. Passmore, eds. *The Wiley Blackwell handbook of the psychology of occupational safety and workplace health*, New York, NY: John Wiley & Sons, 205–227.

Nielsen, M. B., Notelaers, G., and Einarsen, S., 2011. Measuring exposure to workplace bullying. *In*: S. Einarsen, H. Hoel, D. Zapf, and C.L. Cooper, eds. *Bullying and harassment in the workplace: developments in theory, research, and practice*. 2nd ed. Boca Raton, FL: CRC Press, 149–174.

Nielsen, M. B., Notelaers, G., and Einarsen, S., 2020. Methodological issues in the measurement of workplace bullying. *In*: S.V. Einarsen, H. Hoel, D. Zapf, and C.L. Cooper, eds. *Bullying and harassment in the workplace: theory, research and practice*. 3rd ed. Boca Raton, FL: CRC Press, 235–265.

Nielsen, M.B., *et al*., 2021. Associations between exposure to workplace bullying and insomnia: a cross-lagged prospective study of causal directions. *International Archives of Occupational and Environmental Health*, 94, 1003–1011.

Nielsen, M.B., Matthiesen, S.B., and Einarsen, S., 2010. The impact of methodological moderators on prevalence rates of workplace bullying. A meta-analysis. *Journal of Occupational and Organizational Psychology*, 83, 955–979.

Notelaers, G., and Van Der Heijden, B. I. J. M., 2021. Construct validity in workplace bullying and harassment research. *In* P. D'Ccruz, E. Noronha, G. Notelaers, and C. Rayner, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 1), concepts, approaches and methods*. Singapore: Springer, 369–424.

Pamidimukkala, A., and Kermanshachi, S., 2022. Occupational challenges of women in construction industry: development of overcoming strategies using Delphi technique. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 15 (1), 822–859.

Pidd, K., *et al*., 2017. Young construction workers: substance use, mental health, and workplace psychosocial factors. *Advances in Dual Diagnosis*, 10 (4), 155–168.

Rai, A., and Agarwal, U.A., 2018. A review of literature on mediators and moderators of workplace bullying: agenda for future research. *Management Research Review*, 41 (7), 822–859.

Raver, J.L., and Nishii, L.H., 2010. Once, twice, or three times as harmful? Ethnic harassment, gender harassment, and generalized workplace harassment. *Journal of Applied Psychology*, 95 (2), 236–254.

Ribeiro, N., *et al*., 2022. The effect of workplace bullying on burnout: the mediating role of affective well-being. *Management Research Review*, 45 (6), 824–840.

Ross, V., *et al*., 2021. Factors associated with workplace bullying and the mental health of construction industry apprentices: a mixed methods study. *Frontiers in Psychiatry*, 12, 629262.

Salin, D., 2021a. Workplace bullying and culture: diverse conceptualizations and interpretations. *In*: P. D'Cruz, E. Noronha, C. Caponecchia, J. Escartín, D. Salin, and M.R. Tuckey, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 3), dignity and inclusion at work*. Singapore: Springer, 513–538.

Salin, D., 2021b. Workplace bullying and gender: an overview of empirical findings. *In*: P. D'Cruz, E. Noronha, C. Caponecchia, J. Escartín, D. Salin. and M.R. Tuckey, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 3), dignity and inclusion at work*. Singapore: Springer, 331–361.

Salin, D., and Hoel, H., 2020. Organizational risk factors of workplace bullying. *In*: S.V. Einarsen, H. Hoel, D. Zapf, and C.L. Cooper, eds. *Bullying and harassment in the workplace: theory, research and practice*. 3rd ed. Boca Raton, FL: CRC press, 305–329.

Schummer, S.E., *et al*., 2019. The role of need satisfaction for solo self-employed individuals' vs. employer entrepreneurs' affective commitment towards their own businesses. *Journal of Global Entrepreneurship Research*, 9 (63), 1–18.

Siu, O.L., and Cooper, C.L., 1998. A study of occupational stress, job satisfaction and quitting intention in Hong Kong firms: the role of locus of control and organizational commitment. *Stress Medicine*, 14 (1), 55–66.

Stone, R. J., Cox, A., and Gavin, M., 2020. *Human resource management*. 10th ed. Australia: John Wiley & Sons.

Tijani, B., Xiaohua, J., and Osei-Kyei, R., 2021. Critical analysis of mental health research among construction project professionals. *Journal of Engineering, Design and Technology*, 19 (2), 467–496.

Tsuno, K., *et al*., 2010. Measuring workplace bullying: reliability and validity of the Japanese version of the negative acts questionnaire. *Journal of Occupational Health*, 52 (4), 216–226.

Tsuno, K., *et al*., 2015. Socioeconomic determinants of bullying in the workplace: a national representative sample in Japan. *PLoS One*, 10 (3), e0119435.

Tuuli, M.M., 2018. What has project characteristics got to do with the empowerment of individuals, teams and organisations? *International Journal of Managing Projects in Business*, 11 (3), 708–733.

Van den Brande, W., *et al.*, 2021. The moderating effects of coping mechanisms and resources in the context of workplace bullying, emotional abuse and harassment. *In*: P. D'Cruz, E. Noronha, E. Baillien, B. Catley, K. Harlos, A. Høgh, and E.G. Mikkelsen, eds. *Handbooks of workplace bullying, emotional abuse and harassment (Vol. 2), Pathways of job-related negative behavior*. Singapore: Springer, 153–176.

Williams, K.D., and Nida, S.A., 2022. Ostracism and social exclusion: implications for separation, social isolation, and loss. *Current Opinion in Psychology*, 47, 101353.

Yaremych, H.E., Preacher, K.J., and Hedeker, D., 2023. Centering categorical predictors in multilevel models: best practices and interpretation. *Psychological Methods*, 28 (3), 613–630.

Zapf, D., and Einarsen, S.V., 2020. Individual antecedents of bullying: personality, motives and competencies of victims and perpetrators. *In*: S.V. Einarsen, H. Hoel, D. Zapf, and C.L. Cooper, eds. *Bullying and harassment in the workplace: theory, research and practice*. 3rd ed. Boca Raton, FL: CRC press, 269–303.

Zapf, D., and Vartia, M., 2020. Prevention and treatment of workplace bullying: an overview. *In*: S.V. Einarsen, H. Hoel, D. Zapf, and C.L. Cooper, eds. *Bullying and harassment in the workplace: theory, research and practice*. 3rd ed. Boca Raton, FL: CRC Press, 457–495.