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Supervisors' perceived organizational support, span of control, and employees' perceived supervisor support: A multilevel study using supervisor–employee linked data

Takahiro Mori

moritaka6@med.uoeh-u.ac.jp

University of Occupational and Environmental Health Japan https://orcid.org/0000-0003-4636-2253

Tomohisa Nagata

University of Occupational and Environmental Health Japan https://orcid.org/0000-0001-9173-420X

Kiminori Odagami

University of Occupational and Environmental Health Japan https://orcid.org/0000-0001-6258-971X

Koji Mori

University of Occupational and Environmental Health Japan https://orcid.org/0000-0002-8821-4438

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Supervisors' perceived organizational support, span of control, and employees' perceived supervisor support: A multilevel study using supervisor–employee linked data

Takahiro Mori[1], Tomohisa Nagata[1], Kiminori Odagami[1] and Koji Mori[1]

Affiliations:

[1] Department of Occupational Health Practice and Management, Institute of Industrial Ecological Sciences, University of Occupational and Environmental Health, Japan, Kitakyushu, Japan

Corresponding author: Takahiro Mori, MD, PhD

Department of Occupational Health Practice and Management, Institute of Industrial Ecological Sciences, University of Occupational and Environmental Health, Japan, 1-1 Iseigaoka, Yahatanishi-ku, Kitakyushu 807-8555, Japan.

E-mail: moritaka6@med.uoeh-u.ac.jp; Tel: +81-93-691-7523

Abstract

Background

Perceived supervisor support (PSS) has been consistently associated with favorable mental health and work-related outcomes. Supervisors' supportive behaviors, however, may be shaped not only by individual characteristics but also by the extent to which supervisors perceive support from their organization. Empirical evidence examining the association between supervisors' perceived organizational support (POS) and employees' PSS using supervisor–employee linked data is still limited. In addition, it is unclear whether structural characteristics of supervisory roles, such as span of control, influence this association. The present study examined the association between supervisors' POS and employees' PSS and tested whether span of control modified this association using multilevel supervisor–employee linked data.

Methods

This cross-sectional study used questionnaire survey data collected from a Japanese manufacturing company. Supervisor–employee relationships were identified using organizational codes and position information. The analytic sample comprised 1,994 employees nested within 317 supervisors. Supervisors' POS and employees' PSS were assessed using validated Japanese versions of established scales. Multilevel linear regression analyses were conducted to examine the association between supervisors' POS and employees' PSS, accounting for the nested data structure. Span of control was included as a supervisor-level structural variable and tested as a potential moderator.

Results

Supervisors' POS was positively associated with employees' PSS (B = 0.101, 95% CI: 0.030 to 0.172). Span of control showed a negative, but not statistically significant, association with employees' PSS (B = −0.007, 95% CI: −0.016 to 0.001). The interaction between supervisors' POS and span of control was also not statistically significant (B = −0.003, 95% CI: −0.011 to 0.004).

Conclusions

Supervisors' POS was positively associated with employees' PSS, although the association was modest. No statistically significant interaction with span of control was observed. Attention to organizational support for supervisors may complement efforts to improve supervisory behaviors.

Key Words: perceived supervisor support, perceived organizational support, multilevel analysis, organizational support theory, span of control, psychological factors

Introduction

Workplace supervisors play a critical role in shaping the psychosocial work environment, thereby influencing employees' mental and physical well-being and their performance at work. Perceived supervisor support (PSS) is a key construct for assessing psychosocial factors in the workplace. PSS refers to the extent to which employees believe that their supervisors value their contributions, provide assistance, and care about their well-being [1]. Previous research has consistently shown that higher levels of PSS are associated with favorable outcomes for both employees and organizations. At the employee level, high PSS has been associated with a range of positive psychological outcomes, including greater work engagement, job satisfaction, and organizational commitment, as well as lower levels of adverse outcomes such as work-related stress and burnout [2-5]. At the organizational level, high PSS has been linked to desirable outcomes, including reduced productivity loss and lower turnover [6-12]. Together, these findings underscore the importance of PSS as a psychosocial resource that supports employees' mental health and work productivity.

Supervisors' supportive behaviors toward employees are not determined solely by supervisors' personal characteristics or efforts; they may also be shaped by the support supervisors receive from their organization. Perceived organizational support (POS) is a construct used to capture individuals' perceptions of organizational support. POS refers to the extent to which employees believe that their organization values their contributions and cares about their well-being, and it serves as the foundational concept underlying PSS [1,13]. POS is

grounded in organizational support theory, which posits that employees who perceive higher levels of organizational support are more likely to demonstrate positive attitudes and behaviors toward the organization and others, based on the norm of reciprocity [13-15]. Accordingly, supervisors with higher POS may be more likely to engage in supportive behaviors toward their employees. Building on this theoretical foundation, a support cascade—often described as a trickle-down process—has been proposed, whereby support is transmitted sequentially from the organization to supervisors and subsequently from supervisors to their employees [5,7].

However, PSS is not an objective indicator of supervisors' behaviors themselves; rather, it reflects employees' subjective evaluations of their supervisors' behaviors and attitudes as supportive. As a result, even when supervisors display similar supportive behaviors, individual employees may differ in how they perceive and interpret these behaviors, depending on the supervisor–employee relationship and the workplace context [16-18]. Although this distinction between supervisors' behaviors and employees' perceptions is well recognized conceptually, empirical research explicitly examining supervisor–employee relationships within a nested structure remains limited. Notably, Shanock and Eisenberger, in a study conducted in the U.S. retail industry, reported a positive association between supervisors' POS and employees' PSS [7]. In addition, although Frear et al. also examined the association between supervisors' POS and employees' PSS in the U.S. state correctional agency facilities, employees' PSS was aggregated at the supervisor level rather than analyzed at the individual level [5]. Moreover, prior cross-cultural research has suggested that the meaning and effects of

POS may vary across national and cultural contexts [19]. Consequently, individual-level evidence on employees' PSS nested within supervisors— particularly across industries with differing job characteristics and organizational structures, as well as in countries and regions outside the United States—remains limited.

Beyond these considerations, the association between supervisors' POS and employees' PSS may depend on structural characteristics of supervisors' positions within the workplace. One such factor is the number of employees a supervisor directly manages, commonly referred to as the span of control [20]. Previous research suggests that increases in span of control can disperse supervisors' attentional resources and reduce opportunities for interpersonal involvement, thereby diminishing the quality of interactions with employees. Among immediate workplace supervisors, an excessively wide span of control has been shown to hinder supportive behaviors and effective supervisor–employee relationships [21-24].Taken together, these findings suggest that the association between supervisors' POS and employees' PSS may be more pronounced when supervisors manage relatively fewer employees, whereas this association may be weaker when supervisors have a larger span of control. However, to our knowledge, no empirical study has examined whether span of control moderates the association between supervisors' POS and employees' PSS.

Therefore, the present study conducted in the manufacturing industry, one of Japan's major industries, and aimed to examine the association between supervisors' POS and employees' PSS using supervisor–employee linked data analyzed within a nested structure. In

addition, this study examined whether this association is moderated by span of control. The following hypotheses were proposed and illustrated in Figure 1:

H1: Supervisors' POS is positively associated with employees' PSS.

H2: Span of control moderates the association between supervisors' POS and employees' PSS, such that a larger span of control attenuates this association.

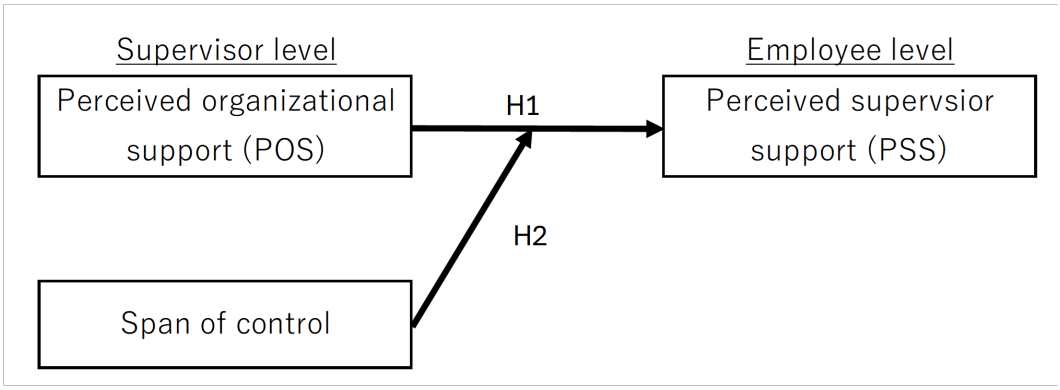


Figure 1. Conceptual model of supervisors' POS, employees' PSS, and span of control. This figure presents the hypothesized associations examined in this study. Supervisors' POS is hypothesized to be positively associated with employees' PSS (H1). Span of control is hypothesized to moderate this association (H2).

Methods

Procedure

This study employed a cross-sectional design using questionnaire survey data and personnel records from a single manufacturing company in Japan. The survey was administered online between September 9 and October 3, 2025, and was distributed through the company's personnel department. To facilitate participation, employees were permitted to complete the questionnaire during working hours. Prior to participation, the purpose of the study and the handling of personal information were explained to all employees. Participation was voluntary, and informed consent was obtained electronically before respondents proceeded with the survey. Participants were assured that their responses would be kept confidential and would not be disclosed to supervisors or workplace management. The same questionnaire was administered to all respondents, regardless of job position. Survey responses were linked to personnel records using anonymized identifiers. Supervisor–employee relationships were identified using organizational codes and position information in the company's personnel records. Supervisors were operationally defined as the managers responsible for the smallest organizational units, based on the company's organizational structure and managerial positions. All other members of the unit, except those holding higher managerial or advisory positions, were defined as employees of that supervisor. The study was approved by the Ethics Committee of the University of Occupational and Environmental Health, Japan (Approval No. H26-026).

Participants

Based on this definition, the analytic sample initially comprised 4,220 employees nested within 511 supervisors in the company's personnel records. The sample included employees from both office and production sections within the company. At the supervisor level, span of control averaged 8.3 employees per supervisor (range: 1–70). Of these, 2,604 employees responded to the survey. After excluding 610 employees whose supervisors did not respond, the final analytic sample consisted of 1,994 employees nested within 317 supervisors. No participants had missing data on the study variables.

Measures

Perceived organizational support (POS)

Supervisors' POS was assessed using the 8-item Japanese version of the Survey of Perceived Organizational Support (SPOS-J) [25]. The validation study of the SPOS-J demonstrated a two-factor structure, consisting of a Sufficiency of Positive Aspects subscale (SPA) and a Minimality of Negative Aspects subscale (MNA), in contrast to the predominantly unidimensional structure of the original SPOS [13]. In the present study, the four-item SPA subscale was used to assess supervisors' POS, consistent with the corresponding SPA subscale used to measure employees' PSS. The full eight-item SPOS-J was used in a sensitivity analysis. Only responses provided by supervisors were used and treated as supervisor-level variables. Responses were recorded on a 7-point Likert scale ranging from 0 (strongly disagree) to 6

(strongly agree). Item scores were averaged, with higher scores indicating higher POS. The internal consistency of the SPA subscale was high (Cronbach's $\alpha = 0.93$).

Perceived supervisor support (PSS)

Employees' PSS was assessed using the Japanese version of the Survey of Perceived Supervisor Support (SPSS-J) [26], which was developed based on SPOS-J [25]. In the present study, the four-item subscale capturing positive aspects of PSS (PSS-SPA) was used, as previous research has demonstrated that the PSS-SPA shows higher validity and reliability than the subscale capturing negative aspects (PSS-MNA). Accordingly, only the PSS-SPA items were included, and PSS was treated as an employee-level variable. Responses were recorded on a 7-point Likert scale ranging from 0 (strongly disagree) to 6 (strongly agree), consistent with the POS measure. Item scores were averaged, with higher scores indicating higher PSS. The internal consistency of the scale was high (Cronbach's $\alpha = 0.96$).

Span of Control

Span of control was defined as the number of employees supervised by each supervisor, calculated from organizational codes and position information in the personnel records, including employees who did not respond to the survey. Span of control was treated as a continuous supervisor-level variable in the analyses.

Control variables

Covariates were included at both the employee and supervisor levels. At the employee level, age, gender, employment status (regular vs. non-regular), and occupation were included as

control variables. Occupation was classified according to the Japanese Standard Occupational Classification [27], with four occupational categories available in the dataset. At the supervisor level, age and gender were included as control variables.

Statistical Analysis

Multilevel linear regression models were used, with employees nested within their immediate workplace supervisors. An intercept-only model (null model) was first estimated to assess the proportion of variance in employees' PSS attributable to the supervisor level.

In the main analyses, the association between supervisors' POS and employees' PSS was examined (Model 1). Span of control was then added to the model (Model 2). An interaction term between supervisors' POS and span of control was subsequently included to examine the moderating effect of span of control (Model 3). Hypothesis 1 was tested in Model 1, and Hypothesis 2 was tested using the interaction term in Model 3. Supervisors' POS and span of control were grand-mean centered, with the means calculated at the supervisor level (n = 317). Models 1–3 were adjusted for the employee- and supervisor-level covariates described above. Models were estimated by maximum likelihood. All analyses were conducted using Stata Statistical Software (Release 19; StataCorp LLC, College Station, TX, USA). Statistical significance was defined as a two-sided p value < 0.05.

Two sensitivity analyses were conducted to examine the robustness of the results. First, span of control was categorized into tertiles at the supervisor level instead of being treated as a

208 continuous variable. Second, supervisors' POS was assessed using the full eight-item SPOS-J,

209 with MNA items reverse-coded.

210

Results

Participant characteristics, descriptive statistics, and correlations

The analytic sample comprised 1,994 employees nested within 317 supervisors. Participant characteristics are summarized in Table 1. The mean age of employees was 41.6 years (SD = 12.9), and 79.6% were men. Most employees were in regular employment (99.2%). Regarding occupation, 50.0% were production workers, 39.3% were professional and technical workers, and 10.7% were clerical workers. The mean age of supervisors was 49.4 years (SD = 5.3), and 95.6% were men.

Table 2 presents the means, standard deviations, and correlation coefficients for the main variables. The correlation between supervisors' POS and employees' PSS was 0.08, that between span of control and employees' PSS was −0.12, and that between supervisors' POS and span of control was −0.07.

Multilevel associations of supervisors' POS, span of control, and employees' PSS

Table 3 presents the results of the multilevel linear regression analyses. The null model indicated that 15% of the variance in employees' PSS was attributable to the supervisor level (ICC = 0.15). In Model 1, supervisors' POS was significantly positively associated with employees' PSS (B = 0.101, 95% CI: 0.030 to 0.172). This association remained significant after adding span of control in Model 2 (B = 0.098, 95% CI: 0.028 to 0.168). Span of control

was not significantly associated with employees' PSS, although the point estimate was negative (B = −0.007, 95% CI: −0.016 to 0.001).

In Model 3, the interaction term between supervisors' POS and span of control was not statistically significant (B = −0.003, 95% CI: −0.011 to 0.004), providing no evidence that the association varied by span of control.

Sensitivity analyses

In the sensitivity analysis using span of control tertiles, supervisors' POS remained significantly positively associated with employees' PSS (B = 0.102, 95% CI: 0.031 to 0.172), and the interaction terms were not statistically significant (Supplementary Table S1).

In the second sensitivity analysis, using the full eight-item POS scale, the association was in the same direction but smaller (B = 0.077, 95% CI: 0.001 to 0.153), and the interaction with span of control was not significant (Supplementary Table S2).

Discussion

This study examined the association between supervisors' POS and employees' PSS in a Japanese manufacturing company using a multilevel analytical approach that accounted for the nested structure of employees within supervisors. The results showed that supervisors' POS was positively associated with employees' PSS, indicating that supervisors who perceived higher levels of organizational support tend to be perceived as more supportive by employees, although the magnitude of this association was modest. However, the interaction between supervisors' POS and span of control was not statistically significant, and this finding was consistent across sensitivity analyses. Taken together, these findings suggest that the association between supervisors' POS and employees' PSS may be relatively stable and not substantially modified by span of control in this study.

The multilevel analyses showed a positive association between supervisors' POS and employees' PSS, supporting Hypothesis 1. This finding is consistent with previous research by Shanock and Eisenberger [7] conducted in the U.S. retail sector and extends it to employees in a Japanese manufacturing company, suggesting that a similar association may be observed in different industrial and cultural settings. The finding is also consistent with the support cascade proposed by organizational support theory. Supervisors receive support from their organizations while also acting as representatives of the organization in their daily interactions with employees. According to the norm of reciprocity, supervisors who perceive greater organizational support may feel obligated to reciprocate by contributing to organizational goals

[2,7]. However, Frear et al. [5] demonstrated that this felt obligation does not necessarily translate into greater support for employees, highlighting the importance of supervisors' perceptions of organizational expectations regarding employee support. The magnitude of the association was modest: a one-standard-deviation difference in supervisors' POS corresponded to a difference of approximately 0.12 points in employees' PSS. Given that employees' PSS varied both between and within supervisor groups (ICC = 0.15), other factors, such as supervisors' supportive behaviors, the quality of supervisor–employee relationships, and employees' individual experiences and expectations, may also be relevant to their perceptions of supervisory support [16–18].

The present study did not find a statistically significant interaction between supervisors' POS and span of control in relation to employees' PSS; therefore, Hypothesis 2 was not supported. Span of control was also not significantly associated with employees' PSS after adjustment for covariates, although the estimated association was negative. Previous studies have suggested that a larger span of control may limit supervisors' ability to provide individual attention and maintain supportive relationships with employees, potentially affecting employee attitudes and work outcomes [21–24,28]. One possible explanation for the present findings is that the number of employees supervised does not fully capture the demands placed on supervisors or their opportunities to interact with employees. These may also depend on job characteristics, organizational structure, and the availability of support resources. For example, some large units in the present study had deputy group leaders who may have shared

supervisory responsibilities. Organizational support theory suggests that employees who perceive greater organizational support may feel obligated to contribute to organizational goals [2,7]. However, supervisors' ability to translate such motivation into supportive interactions with employees may also depend on organizational policies, discretion, and available resources [6,16]. Thus, the association between supervisors' POS and employees' PSS may depend on how supervisory responsibilities and organizational resources are distributed, rather than on span of control alone. Future studies incorporating these factors may help clarify whether and under what conditions span of control modifies this association.

Practical implications

The findings of the present study offer several practical implications. First, the positive association between supervisors' POS and employees' PSS suggests that efforts to improve supervisory support should consider not only supervisors' interpersonal behaviors and communication skills but also the organizational support they receive. Organizations may also benefit from providing support to supervisors and fostering conditions in which supervisors themselves perceive organizational support. This perspective highlights the potential importance of organizational conditions, including available support, discretion, and resources, alongside supervisors' individual attributes.

Second, although span of control did not significantly moderate the association between supervisors' POS and employees' PSS, the findings do not imply that supervisory

304 workload or organizational structure is unimportant. Organizations may need to consider not
305 only the number of employees supervised but also how supervisory responsibilities are
306 distributed and what resources are available to support supervisors, particularly in units with
307 large spans of control.

308 Nevertheless, enhancing supervisors' POS may not necessarily translate into more
309 supportive behaviors toward employees or higher levels of employees' PSS. Frear et al. [5]
310 found a negative indirect association between supervisors' POS and employees' PSS through
311 supervisors' felt obligation to reciprocate organizational support, but a positive indirect
312 association through supervisors' perceptions that the organization expected supportive
313 treatment of employees. These findings suggest that organizations should not only provide
314 support to supervisors but also communicate clear expectations regarding supportive treatment
315 of employees.

316

317 **Strength & Limitation**

318 This study has several strengths. First, we linked employees with their corresponding
319 supervisors and conducted multilevel analyses that accounted for the supervisor–employee
320 nested structure, allowing the association between supervisors' POS and employees' PSS to be
321 examined within the supervisory context rather than solely at the individual level. Second,
322 supervisors' POS and employees' PSS were reported by different respondents, and span of

control was derived from personnel records rather than self-reports. This multi-source design reduces concerns related to common method bias.

Several limitations should be acknowledged. First, this study was conducted in a single manufacturing company in Japan, and the analytic sample was restricted to employees with identifiable supervisor–employee linkages, potentially limiting generalizability. Employees whose supervisors did not respond, particularly those in professional sections, were excluded. Although PSS scores were similar between included and excluded respondents, selection bias cannot be ruled out. Second, this study did not examine the supervisory behaviors or other mechanisms underlying the association between supervisors' POS and employees' PSS. Third, information on supervisors' managerial experience was unavailable, and supervisors' organizational tenure was not adjusted for, although these factors may influence supervisory behaviors and employee perceptions [28,29]. Fourth, employees may have evaluated someone other than the operationally defined supervisor when responding to the PSS items, such as a deputy group leader in large units. Fifth, the estimated interaction between supervisors' POS and span of control was imprecise, and small moderating effects cannot be ruled out. Finally, the cross-sectional design precludes causal inference. Longitudinal studies across diverse occupational settings are needed to clarify the temporal relationships between supervisors' POS and employees' PSS.

Conclusion

This study employed a multilevel analytical approach linking supervisors and employees in a Japanese manufacturing company and found a positive, albeit modest, association between supervisors' POS and employees' PSS. No statistically significant interaction was observed between supervisors' POS and span of control. These findings suggest that attention to the organizational support that supervisors themselves receive may complement efforts to improve supervisory behaviors. Further research is needed to clarify the mechanisms underlying this association and the conditions under which organizational support may contribute to supportive supervisory relationships.

List of abbreviations

MNA – Minimality of Negative Aspects

POS – Perceived organizational support

PSS – Perceived supervisor support

SPA – Sufficiency of Positive Aspects

SPOS-J – Japanese version of the Survey of Perceived Organizational Support

Declarations

Ethics approval and consent to participate: This study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the University of Occupational and Environmental Health, Japan (Approval No. H26-026). Participation in the web-based questionnaire survey was voluntary, and informed consent was obtained electronically prior to participation. Company-provided administrative data were used in accordance with the approved study protocol. All data were anonymized prior to analysis.

Consent for publication: Not applicable

Availability of data and materials: The datasets generated and/or analyzed during the current study are not publicly available due to privacy and ethical restrictions, but are available from the corresponding author on reasonable request, subject to ethical approval and data use agreements.

Competing interests: TN reports that his laboratory has received fees for academic consulting services from EWEL Inc. and that he has received personal fees from EWEL Inc., outside the submitted work. KM reports that his former laboratory received fees for academic consulting services from EWEL Inc. until March 2026, outside the submitted work. The other authors declare that they have no competing interests.

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Authors' contributions: TM, TN, KO, and KM conceived the study ideas; TM and TN coordinated with the participating company and collected the data; TM designed the analysis, analyzed the data, and wrote the draft of the manuscript. All authors contributed to the interpretation of the data and reviewed, edited, and approved the final manuscript.

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Table 1. Characteristics of subordinate and supervisor participants

Characteristics	Total
Employee level (n=1,994)	
Age, mean (SD)	41.6 (12.9)
Gender, men, n (%)	1,587 (79.6)
Employment status, n (%)	
Regular employees	1,978 (99.2)
Non-regular employees	16 (0.8)
Occupation, n (%)	
Professional and technical	783 (39.3)
Clerical	213 (10.7)
Production	997 (50.0)
Other	1 (0.1)
Supervisor level (n=317)	
Age, mean (SD)	49.4 (5.3)
Gender, men, n (%)	303 (95.6)
Span of control, median (IQR)	7 (4–12)

Table 2. Means, standard deviations, and correlations among variables

	M	SD	1	2
1. Employees' PSS	3.69	1.42		
2. Supervisors' POS	4.04	1.16	0.08***	
3. Span of control	9.56	8.52	−0.12***	−0.07

Note. POS, perceived organizational support; PSS, perceived supervisor support. Descriptive statistics were calculated at the employee level for PSS (n = 1,994) and at the supervisor level for POS (SPA) and span of control (n = 317). Correlations involving PSS were calculated at the employee level, with supervisor-level values assigned to employees; the correlation between POS (SPA) and span of control was calculated at the supervisor level. *** $p < 0.001$.

Table3. Association between supervisors' POS and span of control with employees' PSS

	Null model		Model 1		Model 2		Model 3	
	B (95% CI)	*P* value	B (95% CI)	*P* value	B (95% CI)	*P* value	B (95% CI)	*P* value
Fixed effects								
Supervisors' POS			0.101 (0.030 to 0.172)	0.005	0.098 (0.028 to 0.168)	0.006	0.108 (0.034 to 0.182)	0.004
Span of control					−0.007 (−0.016 to 0.001)	0.091	−0.009 (−0.018 to 0.000)	0.059
Interaction effect								
Supervisor's POS × Span of control							−0.003 (−0.011 to 0.004)	0.388
Random effects								
Supervisor-level variance	0.300		0.178		0.173		0.169	
Employee-level (residual) variance	1.738		1.662		1.662		1.663	
ICC	0.15							

Note. N = 1,994 employees nested within 317 supervisors. B, unstandardized coefficient; CI, confidence interval; ICC, intraclass correlation coefficient; POS, perceived organizational support; PSS, perceived supervisor support

The null model included no predictors and was used to estimate the ICC.

Models 1–3 were adjusted for employee age, gender, employment status, and occupation, and supervisor age and gender. Model 1 included supervisors' POS (SPA); Model 2 additionally included span of control; and Model 3 further included their interaction term. Supervisors' POS and span of control were grand-mean centered using supervisor-level means (n = 317).

Figures

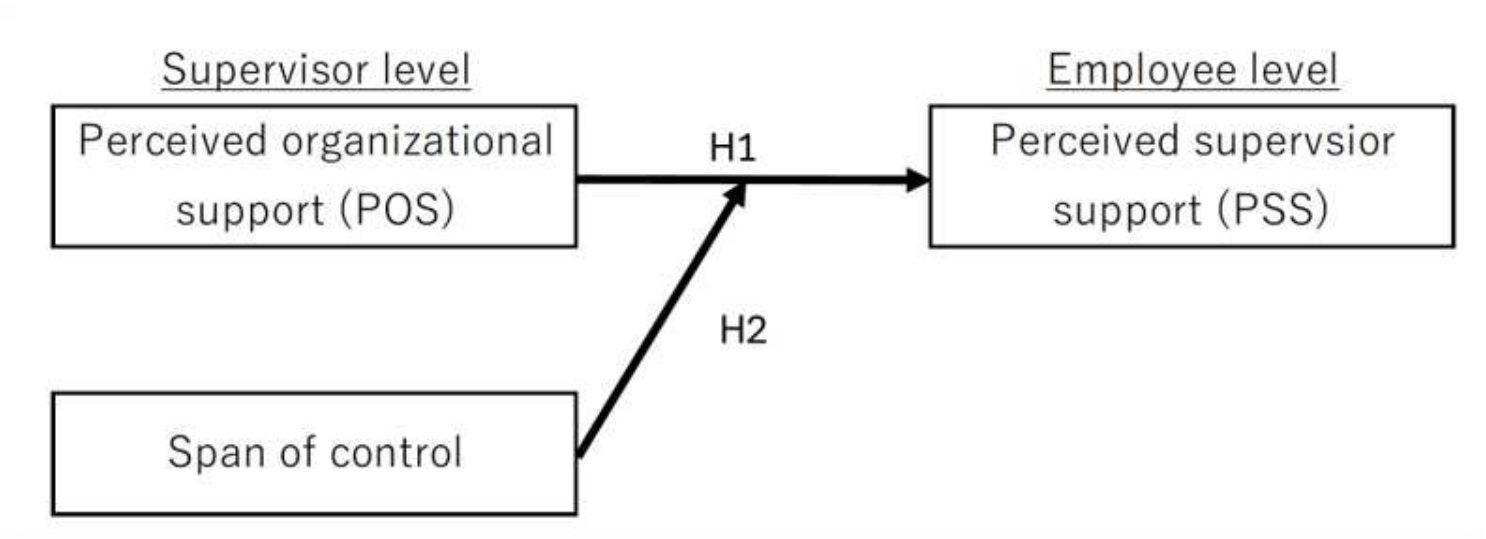


Figure 1

Conceptual model of supervisors' POS, employees' PSS, and span of control.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryTableS1.docx
- SupplementaryTableS2.docx