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Exploring factors associated with healthcare professionals' subjective perceptions of complex issues in primary care in Japan: a self-administered survey study on confidence, satisfaction and burden levels

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ABSTRACT

Objective The aim of this study was to explore factors associated with healthcare professionals' subjective perceptions of complex issues in primary care settings in Japan.

Design Cross-sectional survey conducted through a self-administered web-based questionnaire.

Setting Japan, from June to October 2020.

Participants Healthcare professionals recruited via an email list from the Japan Primary Care Association.

Measures The questionnaire assessed subjective perception of satisfaction, confidence and burden regarding complex issues using a 100 mm Visual Analogue Scale (VAS). Explanatory variables included the Japanese version of the Self-assessment Scale of Interprofessional Competency (JASSIC), basic demographic information, administrative experience and an organisational climate scale. This scale comprised the 'Plan, Do, See' (PDS) factor for management and the 'Do' factor in a leader-centred direction for those working under compulsion. Factors associated with subjective perceptions were analysed using binomial logistic regression analysis and Bonferroni analysis ($p<0.017$).

Results Data from 593 participants (average age of 41.2 years, including 133 nurses, 128 physicians and 120 social workers) were analysed. Median (quartile) VAS scores for satisfaction, confidence and burden were 50 (36–70), 52 (40–70) and 50 (30–66), respectively. Higher satisfaction group was significantly associated with PDS factor, Do factor and JASSIC Score. Greater confidence group associated with older age, male, Do factor, administrative experience and JASSIC Score. No factors were significantly associated with the higher perceived burden.

Conclusion These findings reveal that interprofessional competency self-assessment influence perceptions of complex issues among healthcare professionals. Moreover, satisfaction with complex issues might be enhanced by a manageable organisational climate, while confidence might be influenced by personal attributes.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Conducts a comprehensive exploration of healthcare professionals' subjective perceptions using a survey across diverse participants in Japan, ensuring broad insights into primary care complexities.
⇒ Employs validated tools such as the Japanese version of the Self-assessment Scale of Interprofessional Competency to provide reliable data on interprofessional competency and its impact on managing complex healthcare issues.
⇒ The study's cross-sectional design and reliance on self-reported data limit the ability to infer causality and may introduce response bias, potentially affecting the interpretation of perceptions of complex healthcare issues in primary care.

INTRODUCTION

The WHO has underscored the importance of implementing integrated, people-centred health services, particularly for individuals requiring care and support for complex health conditions due to multiple physical and psychosocial factors.[1] Elderly individuals with multiple health issues commonly experience disease complications and dysfunction, necessitating healthcare that spans various levels of care and social services.[2] The complexity of such care poses challenges for medical and social professionals involved,[3] yet the factors associated with healthcare professionals' subjective perceptions of these complex issues have scarcely been explored and remain unclear.

In primary care, many patients presenting for treatment have complicating factors, such as multimorbidity, which are not adequately

addressed by single-disease guidelines.[4 5] Instead, these patients benefit from interprofessional approaches tailored to multimorbidity.[5 6] Furthermore, clear and compassionate communication becomes challenging for healthcare providers when dealing with emotionally charged discussions, including treatment goals and end-of-life discussions.[7] Physicians, in particular, may lack the necessary communication skills or confidence to engage in these complex discussions.[8] Notably, nurses often excel in interprofessional collaboration compared with other professionals,[9 10] while subjective perceptions of complex care may be influenced by personal and environmental constraints.[11] Scoping reviews on physiotherapy collaboration within primary care have identified several barriers, including physicians' limited understanding of physiotherapy's scope, inefficient teamwork and substantial workload and scheduling challenges for physiotherapists.[12] These barriers are further exacerbated by ambiguities in physiotherapists' roles, patients' lack of awareness about physiotherapy services and a general deficiency in organisational knowledge about these services.[13 14] In contrast, the vital role of hospital social work in enhancing healthcare team collaboration is recognised through its emphasis on proactive communication to build relationships and facilitate information exchange, initiatives for team training and patient advocacy and effective risk management strategies.[15] These strategies aim to ensure seamless patient discharges and reduce liability risks. The significance of social work is consistently acknowledged across various healthcare settings, including primary care clinics, highlighting its indispensable contribution to improving teamwork in healthcare.[16]

Subjective perceptions of professional satisfaction and confidence in handling complex tasks can reflect the outcomes of these tasks. Job satisfaction boosts staff enthusiasm, contributes to organisational success and is instrumental in delivering high-quality services.[17] Professional confidence is defined as 'the belief or conviction that one can successfully accomplish a task or achieve a certain level of performance, as well as expressing a sense of control that influences the outcome'.[18] Given these findings, we speculated that patient outcomes for complex issues might be associated with professional satisfaction and confidence. Moreover, the ability to manage complex issues confidently and satisfactorily is a crucial competency for health professionals. Psychological burden, potentially leading to healthcare provider burnout, is another factor impacted by complex care.[19–21] To date, few studies have examined the factors associated with healthcare professionals' subjective perceptions of satisfaction, confidence and burden regarding complex care and interprofessional competencies. The identification of key variables within primary care is crucial for devising strategies aimed at enhancing interprofessional collaboration and the overall quality of care.[22 23] The insights derived from this study are intended to guide the development of practical interventions and policy initiatives designed to promote more cohesive healthcare teams.[23–25] By understanding these dynamics, we can enhance satisfaction among healthcare providers, thereby contributing to substantial advancements in primary care practices. Given the timing of this study amidst the global COVID-19 pandemic, it is crucial to acknowledge the unique and unprecedented challenges faced by healthcare professionals during this period.[26 27] The pandemic has not only intensified the complexity of healthcare delivery but has also potentially affected healthcare professionals' perceptions of satisfaction, confidence and burden.[28–30] These factors are pivotal to our investigation, and as such, the results of this study should be interpreted with an understanding of the extraordinary circumstances under which the data were collected. The pandemic's widespread impact on healthcare systems worldwide provides a critical backdrop for our analysis, influencing both the context and the responses of the healthcare professionals who participated in our study.

Here, we aimed to explore factors significantly associated with healthcare professionals' subjective perceptions of complex issues in primary care in Japan through a comprehensive survey.

METHODS

Design and setting

A cross-sectional survey was conducted in Japan from June to October 2020 based on a self-administered web-based questionnaire.

Participants

Primary care providers in routine interprofessional collaboration across various health professions were included. Participants were recruited through two primary methods: an email link from the Japan Primary Care Association (JPCA)[31] email list and directly email. The JPCA, established in 2010 through the merger of three academic societies in primary care academic societies, represents Japan's primary care sector with 10 023 doctors, 755 pharmacists and 688 other health professionals registered as of September 2022.[32] Due to the exponential non-discriminative snowball sampling used to ensure broad and unbiased representation across different regions of Japan, accurately calculating response rates was not feasible.[33] This approach was specifically chosen to mitigate regional bias and address the low responses from nurses, pharmacists and rehabilitation therapists, reflecting the interprofessional nature of primary care in Japan.

Survey instrument

The survey, requiring consent for participation, was administered via a web-based platform. It included a Visual Analogue Scale (VAS) for assessing subjective perception of satisfaction, confidence and burden regarding complex healthcare issues. Explanatory variables included the total score of the Japanese version of the Self-assessment Scale

of Interprofessional Competency (JASSIC), basic demographic information, professional and institutional experience, administrative experience and understanding of management ('Plan, Do, See' (PDS) factor) and leader-centred direction for people who work in an unwilling manner ('Do' factor), as per the organisational climate questionnaire.[34 35]

The VAS assesses psychometric properties independent of qualitative characteristics, demonstrating stability and high inter-rater reliability.[36] Literature review and consideration of complex issue impacts and interprofessional competencies informed the selection of explanatory variables.[9 37–39] Participants rated their confidence, satisfaction and burden on complex issues from 0 to 100 on the VAS, with scores divided into high and low groups at the 50 mm midpoint. The question designed to elicit broad reflections was:

'We would like to ask you about the response to complex healthcare issues in your area or facility. Where would you place your confidence/satisfaction/level of burden in responding to the complex healthcare issues you are currently facing?'

This question aims to provide quantitative assessments of satisfaction, confidence and perceived burden, offering insights into the emotional and professional impacts of managing complex healthcare issues.

Recognising the potential influence of interprofessional competencies on subjective perceptions of complex healthcare issues, this study used the Japanese version of the JASSIC to assess these competencies. The JASSIC, which we have previously validated through a robust statistical process,[40 41] encompasses an interprofessional competency framework consisting of six domains. This framework is structured around six factors, with a total of 18 items, including 3 items per domain.

Furthermore, we posited that administrative experience, defined as holding a leadership role within a unit, department or institution, could play a significant role in navigating complex issues. The concept of organisational climate, evolving from Lewin's initial work on experimentally created social climates,[42] also forms a critical component of our analysis. One definition of organisational climate is 'the meanings people attach to interrelated bundles of experiences they have at work'.[43] In alignment with this conceptual framework, we adopted an organisational climate questionnaire characterised by a two-factorial structure: the 'PDS' factor for management and the 'Do' factor, which reflects a leader-centred direction.[44] The PDS factor implies an organisational climate conductive to the effective implementation of Plan–Do–Check–Act (PDCA) cycle, suggesting that high scores are indicative of a more favourable physical and psychological environment, the clearer activity planning, grater managerial attention and a more autonomous climate with extensive organisational member participation.[45] Conversely, the 'Do' factor refers to a highly pressured, coercive and unfair organisational climate where employees may feel compelled to work under unfavourable conditions. Higher scores on the 'Do' factor score denote a more manager-centred organisation with the lower staff participation and increased workplace tension.

The questionnaire includes 10 items for each of a PDS (10 items) and a Do factor (10 items), reflecting aspects of the organisational climate that could influence interprofessional competency. Responses were collected using a 5-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree), allowing for a total score range from 10 to 50 points for each factor.

The details of the Japanese and English versions of this questionnaire can be referred to in online supplemental file 1.

Statistical analysis

We examined variable distribution and descriptive statistics, exploring associations between the exploratory and the objective variables (VAS scores). VAS scores for satisfaction, confidence and burden of complex healthcare issues and other continuous variables are each presented as mean (SD or median (range)). To enhance the interpretability of our exploratory analysis, we categorised VAS scores into high and low groups. This decision was informed by the study's exploratory nature and the limited practical significance of minor changes in VAS scores. By simplifying the data into binary variables, we aimed to uncover broad trends and relationships that offer preliminary insights into the complex dynamics of satisfaction, confidence and perceived burden among healthcare professionals in primary care settings.

In univariate analysis, we examined differences between the two groups by using a t-test for continuous variables and χ^2 test or Fisher's exact test for categorical variables, to identify factors associated with the VAS scores related to satisfaction, confidence and burden. Variables with moderate association ($p<0.1$) underwent binomial logistic regression analysis,[46] considering confounders such as age, type of professionals, administrative experience and 20 organisational climate items. Given the tendency of nurses to engage more in a collaborative culture compared with other professionals, we categorised the data by profession, distinguishing between nurse and non-nurse (other professionals).[9 38] To eliminate potential multicollinearity, we reviewed significant explanatory variables based on correlation coefficients, selecting those for inclusion in the binomial logistic regression analysis to avoid redundancy. Sensitivity analysis used threshold values of 40% and 60% for the VAS scores, ensuring a comprehensive evaluation of variables' impacts. All statistical analyses were performed using IBM SPSS V.27.0. To account for the analysis of three objective variables within the binominal logistic regression framework, we applied Bonferroni correction, setting the significant level at $p<0.017$, to maintain analytical rigour.[47]

Sample size

For the binomial logistic regression analysis, aiming for 15 and 20 observations per predictor, the target a sample size exceeded 240 participants.[48]

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans.

RESULTS

A total of 593 self-administered web-based questionnaires were analysed. The respondents had an average age of 41.2 (SD=11.3), with 312 being women (52.6%). The average years of professional experience and work experience at the current institution were 16.4 (SD=9.7) and 9.2 (SD=8.3), respectively. The professional breakdown included 133 nurses (22.4%), 128 doctors (21.6%), 120 social workers (20.2%) and 113 rehabilitation therapists (19.1%). Further, 303 participants (51.1%) reported having administrative experience. The average and median of total JASSIC Score were 71.5 (SD=9.8) and 72 out of 90 (range: 66–78), respectively. The PDS and Do factors scored an average of 31.6 (SD=6.0) and 26.7 (SD=6.4), respectively (table 1).

Regarding the objective variables, the average (SD) and median VAS Score for satisfaction, confidence and burden regarding complex healthcare issues were 51.3 (SD=23.3) and 50 (range: 36–70), 53.7 (SD=22.3) and 52 (range: 40–70) and 47.7 (SD=24.3) and 50 (range: 30–66), respectively (table 2).

To identify the explanatory factors associated with healthcare professionals' subjective perceptions of complex healthcare issues, we compared sociodemographic characteristics, professionals, total JASSIC Score, PDS factor and Do factor between the high-scoring and low-scoring groups in univariate analyses (online supplemental table 1).

Univariate analysis revealed significant associations with the higher satisfaction group at a significance level of <0.1 for age, gender, profession (nurse or non-nurse), administrative experience, total JASSIC Score, PDS factor and Do factor (online supplemental table 1). Binomial logistic regression analysis was performed with these explanatory variables, cording gender, profession and administrative experience as female=1, nurse=1 and 1=yes, respectively. The ORs for administrative experience, PDS factor, total JASSIC Score and Do factor were 1.602 (95% CI 1.070 to 2.400, p=0.022), 1.121 (95% CI 1.076 to 1.167, p<0.001), 1.030 (95% CI 1.009 to 1.052, p=0.005) and 0.955 (95% CI 0.922 to 0.989, p=0.010), respectively (table 3).

For the more confident group, significant associations at <0.1 included age, gender, professional and institutional experience, administrative experience, total JASSIC Score, PDS factor and Do factor (table 3). Due to collinearity, only years of professional experience was employed in the subsequent analysis. The OR for total JASSIC Score, age, Do factor and gender were 1.074 (95% CI 1.049 to 1.099, p<0.001), 1.052 (95% CI 1.028 to 1.076, p<0.001), 0.947 (95% CI 0.914 to 0.982, p=0.003) and 0.404 (95% CI 0.262 to 0.623,<0.001), respectively (table 3).

Table 1 Demographic characteristics of 593 professional healthcare participants in this cross-sectional study about interprofessional education, 2020

Characteristic	
Basic demographic information	
Mean age (years)	41.2 (11.3)
Female, n (%)	312 (52.6)
Mean years of experience as professional (years)	16.4 (9.7)
Mean years of experience working at the current institution (years)	9.2 (8.3)
Attendance type (regular)	557 (93.9)
Administrative experience (yes)	303 (51.1)
Profession (including duplicates), n (%)	
Nurses	133 (22.4)
Physician	128 (21.6)
Social worker	120 (20.2)
Rehabilitation therapist	113 (19.1)
Pharmacist	59 (9.9)
Care manager	25 (4.2)
Psychiatric social worker	22 (3.7)
Care worker	14 (2.4)
Others	35 (5.9)
Facility n (%)	
University hospital (over 500 beds)	55 (9.3)
Medium hospital (100–499 beds)	238 (40.1)
Small hospital (20–99 beds)	43 (7.3)
Clinic	99 (16.7)
Home-visit nursing station	23 (3.9)
Pharmacy	26 (4.4)
Administrative agency	10 (1.7)
Nursing home	28 (4.7)
Others	71 (12.0)
Total JASSIC Score	
Mean (SD)	71.5 (9.8)
Median (IQR)	72 (68–78)
PDS factor	
Mean (SD)	31.6 (6.0)
Median	32 (28–36)
Do factor	
Mean (SD)	26.7 (6.4)
Median	26 (22–30)

Do factor, top–down ordering of work, such as in a leader-centred organisation; JASSIC, Japanese version of the Self-assessment Scale of Interprofessional Competency; PDS factor, 'Plan, Do, See' action for management.

Table 2 VAS Score of satisfaction, confidence and burden of 593 professional healthcare participants in this cross-sectional study in 2020

VAS Score of satisfaction (100 mm)	
Mean (SD)	51.3 (23.3)
Median (IQR)	50 (36–70)
VAS Score of confidence (100 mm)	
Mean (SD)	53.7 (22.3)
Median (IQR)	52 (40–70)
VAS Score of burden (100 mm)	
Mean (SD)	47.7 (24.3)
Median (IQR)	50 (30–66)

VAS, Visual Analogue Scale.

The analysis of factors associated with a heavier burden did not reveal any significant associations (table 3). Consequently, we did not proceed with multivariate analysis for this aspect, as the lack of significant findings in the univariate analysis suggested further analysis was unlikely to yield meaningful insights into the factors influencing the subjective burdens of healthcare professionals in interprofessional collaboration.

Sensitivity analysis, employing threshold values of 40% and 60% for VAS scores, corroborated these findings (online supplemental file 2).

DISCUSSION

This study suggests that interprofessional competency may influence healthcare professionals' satisfaction and confidence in addressing complex issues in primary care. A manageable organisational climate can enhance satisfaction, while personal attributes may shape confidence. Interestingly, no factor was identified as being associated with a heavier burden of complex healthcare issues, highlighting distinct relationships between subjective perceptions in dealing with complex healthcare issues and variables such as interprofessional competency, organisational climate and personal attributes.

Satisfaction and confidence in complex care were linked to the self-assessment of interprofessional competency, aligning with previous findings that underscore the necessity of interprofessional collaboration for complex issues.[49] For instance, a study within a nursing home visited complex patients as opportunities for interprofessional learning, where participants managed complex issues through developed facilitation skills and the ability to structure new knowledge amidst professional conflicts.[50] Considering the inherent uncertainty in many complex issues, where health professionals often perceive challenges vaguely, we propose comparing these findings to the model of uncertainty in complexhealth care environments.[51] (figure 1) This model illustrates how uncertainties in healthcare are interconnected across personal, scientific and practical categories, suggesting that

Table 3 Binomial logistic regression analysis of the association with higher satisfaction and more confidence by sociodemographic characteristics in this cross-sectional survey of 593 Japanese professional healthcare participants in primary care

Variable	OR	95% CI	P value
Satisfaction			
Age	1.006	0.985 to 1.027	0.596
Gender (female:1)	0.859	0.569 to 1.298	0.47
Profession (nurse:1)	0.727	0.449 to 1.179	0.196
PDS factor	**1.121**	**1.076 to 1.167**	**<0.001**
Do factor	**0.955**	**0.922 to 0.989**	**0.01**
Administrative experience	1.602	1.070 to 2.400	0.022
JASSIC	**1.03**	**1.009 to 1.052**	**0.005**
Confident			
Age	**1.052**	**1.028 to 1.076**	**<0.001**
Gender (female:1)	**0.404**	**0.262 to 0.623**	**<0.001**
Profession (nurse:1)	1.166	0.713 to 1.908	0.54
PDS factor	1.025	0.986 to 1.067	0.212
Do factor	**0.947**	**0.914 to 0.982**	**0.003**
Administrative experience	1.296	0.855 to 1.963	0.222
JASSIC	**1.074**	**1.049 to 1.099**	**<0.001**

Binomial logistic analysis of the association with more satisfaction, and the more confident group about complex issues. Bold text indicates a statistically significant correlation with a p value less than 0.17.
Do factor, top–down management style, such as in a leader-centred organisation; JASSIC, Japanese version of the Self-assessment Scale of Interprofessional Competency; PDS factor, 'Plan, Do, See' action for management.

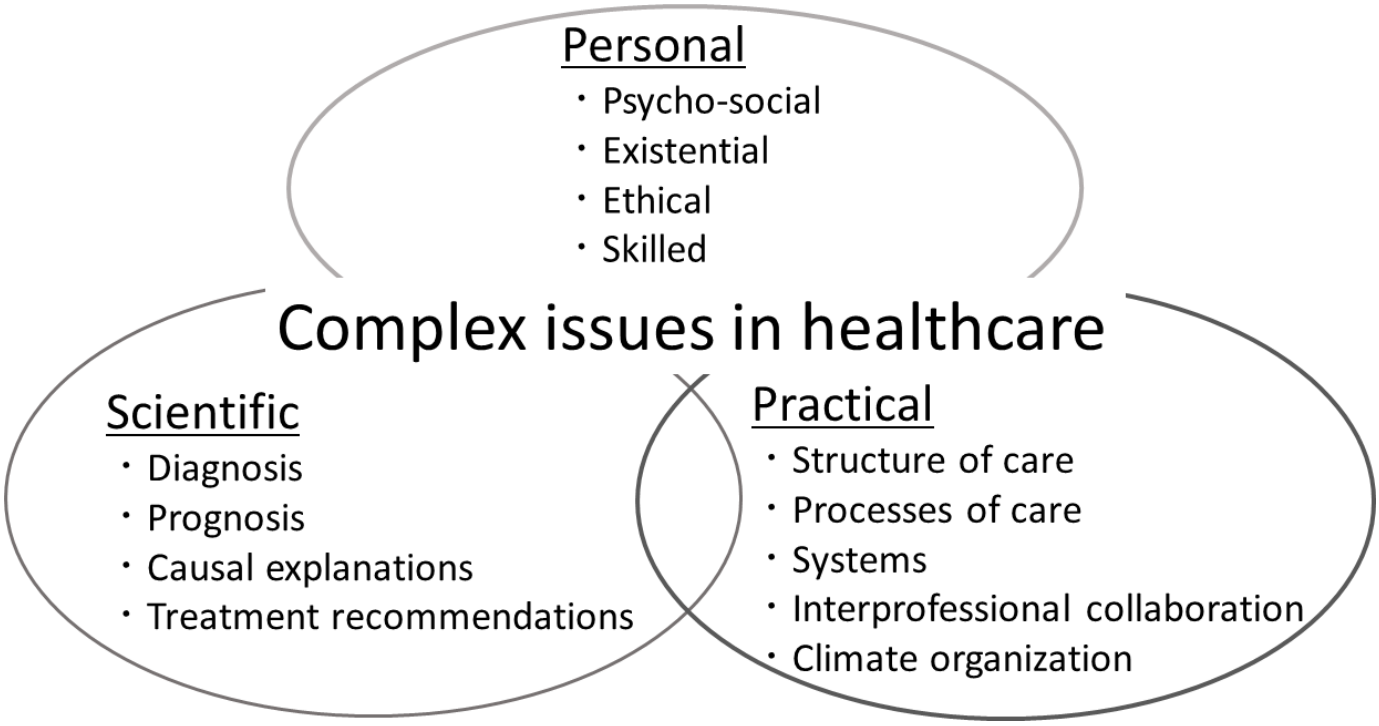

Figure 1 Revised model of uncertainty in a complex healthcare setting.

ongoing engagement with complex issues may enhance interprofessional competency and frame such issues as learning opportunities.

The identified associations of age, administrative experience and organisational climate with satisfaction regarding complex healthcare issues suggest that an overarching organisational perspective is crucial for addressing complex challenges. This encompasses understanding the healthcare environment and the organisation, interpersonal and communication skills and the ability to lead and manage change.[52] A collaborative communication strategy, essential for administrative roles, includes maintaining the free flow of information among team or organisation members.[53] An adaptable organisational climate, resistant to fragmentation in care, supports the integration of complex issues,[54] suggesting that satisfaction associated with an organisational climate conductive to the PDCA cycle.[55]

Furthermore, our findings indicate that satisfaction with complex issues may be higher in less authoritarian organisation, where hierarchical and autocratic leadership styles are often linked with poorer healthcare outcomes.[56] Conversely, authoritarian leadership might be advantageous in emergencies.[56] However, for ongoing positive management of complex issues, a non-hierarchical communication style and the timely, appropriate suggestions of ideas are vital.[57] Satisfaction regarding complex issues may be affected by the organisational climate of the unit, department or institution in which providers work, and the formation or incomplete formation of their interprofessional identity,[58 59] but not solely by personal attributes and individual experiences, including age and administration.

Confidence in dealing with complex issues was influenced by age and gender, with men and those with more experience showing higher confidence,[60] and the association between professional inexperience and low confidence was similar to that reported previously.[61] However, the relationship between confidence and competence, particularly in specific clinical skills,[62] is complex and not always direct. High confidence, especially if based solely on personal attributes, might not accurately reflect competence.[63] Confidence is not a substitute for competence and can be mistaken for arrogance.[61] Given these findings, healthcare professional satisfaction may provide a more relevant and authentic assessment of clinical outcomes, but further validation is required.

A notable finding is that individual or organisational factors did not significantly associate with a heavier burden of complex healthcare issues. This contrasts with studies on health professionals involved in COVID-19 treatment, where workload and future uncertainty were major stressors, suggesting that psychological burden.[64] Attributes such as hospital work and nursing have also been reported to affect psychological burden.[65] Review studies suggest that psychological resources may ease the burden on mental health for healthcare providers.[66] In this light, the interaction of individual and organisational variables in this study may have offset factors associated with burden and could not therefore be identified. Further verification is required.

Our findings highlight significant insights into healthcare professionals' perceptions of complex issues within primary care settings. However, it is important to contextualise these results within the ongoing COVID-19 pandemic, which has undoubtedly

influenced the experiences and responses of participants. The pandemic has presented a multitude of challenges, from increased workloads to the rapid adaptation of new practices and protocols, which could have significantly impacted the levels of satisfaction, confidence and burden reported by healthcare professionals. Therefore, while interpreting our findings, one must consider the potential effects of the pandemic situation on these perceptions. The pandemic's influence underscores the necessity for resilience and adaptability in healthcare settings, pointing to areas where support and resources might be optimised to address the evolving needs of healthcare professionals during such crisis situations.

Several limitations of this study warrant mention. First, potential self-selection bias may exist, as the professionals who participated were self-selected recipients recruited using an email list and with indiscriminate snowball sampling.[41] Second, our analysis by type of professional was limited to nurses and non-nurses, necessitating a broader, more representative sample for comprehensive analysis (more professional categories, regional differences, hospital size, etc). As this study is fundamentally an exploratory study with a limited participant pool, the extent of its generalisability should be approached cautiously. Future studies should also evaluate objective measures associated with satisfaction about complex issues, such as clinical outcomes. Third, the timing of this study during the COVID-19 pandemic might have influenced the subjective perceptions of the complex healthcare issue.[67 68] Due to the disruption caused by COVID-19 to the social system and the resulting confusion regarding the complex problem,[69 70] respondents' satisfaction, confidence and perceived burden in dealing with the issue might have been more grounded in reality in their responses. Last, the potential overestimation of risk associated with the ORs in logistic regression highlights the need for cautious interpretation of our findings, particularly in decision-making contexts.[71] Nevertheless, allowing for these limitations, and given the current lack of evidence on factors associated with health professionals' subjective perceptions of complex issues, this study is valuable because it identifies factors associated with satisfaction about complexity, interprofessional competencies and administrative experience. Our findings—that an organisational climate that is not strongly hierarchical facilitates the promotion of quality improvement to improve the system of the medical institution to which it belongs and is associated with high satisfaction on complex issues—can be applied to clinical practice and have international significance for continuous professional development and interprofessional education in primary healthcare. Additionally, its relevance could extend to future research endeavours for both health professionals and policy-makers, given that the satisfaction of health professionals with increasingly intricate issues could serve as a reflection of the healthcare institutions' quality.

CONCLUSION

The study suggests that interprofessional competency, administrative experience, age and organisational climate significantly influence satisfaction with complex healthcare issues, while confidence is shaped by gender and age. These findings underscore the importance of fostering a supportive, non-hierarchical organisational climate and continuous development in primary healthcare, offering insights for both clinical practice and future research.

Contributors JH and RG conceived and designed the study, conducted all inquiries, and analysed the data. JH primarily wrote and revised the manuscript, while RG reviewed and approved the final version. Both JH and RG had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. JH agrees to serve as the guarantor of the work, ensuring that questions related to any part of the work are appropriately investigated and resolved.

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Competing interests None declared.

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Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by the ethics committee of the faculty of medicine, University of Tsukuba (No. 1483). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available. The data collected and analysed during the current study are not publicly available because we did not receive informed consent concerning data sharing from the participants.

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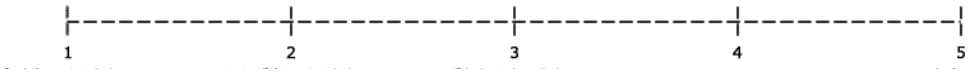
Web Survey（English）

1) Reflecting on your usual interactions with multi-healthcare professionals in your current organization, please select the number that best applies to each of the following questions.



Not applicable Neither Highly Applicable

*Other professions refer to professions other than one's own, and multi-healthcare professionals refers to various professions, including one's own.

Domain 1: Patient, client, family and community centered

1. I regularly convey the concepts of values and concerns of the patients/clients/their families to multi-healthcare professionals.
2. I discuss the goals of therapeutic interventions and healthcare focused on patients/clients/their families with multi-healthcare professionals.
3. I share what I have communicated to patients/clients/their families with multi-healthcare professionals involved in the therapeutic intervention and healthcare.

Domain 2: Interprofessional Communication

4. I regularly convey information that I have come to acquire to multi-healthcare professionals.
5. When I answer and ask questions with patients/clients/their families, I pay due respect to multi-healthcare professionals for their roles and opinions (including non-verbal communication).
6. I explain my own views and opinions in terms clearly understandable to other professionals.

Domain 3: Fulfill the role of the profession.

7. I convey my general knowledge and concept of values to other professions.
8. I fulfil my responsibility among multi- healthcare professionals in the care of patients and clients.
9. I fill the role and functions requested of me by multi-healthcare professionals.

Domain 4: Working on Relationships

10. I have an equal relationship with multi-healthcare professionals.
11. I feel I am growing together with multi-healthcare professionals.
12. I am careful about not causing situations of interpersonal conflicts with multi-healthcare professionals.

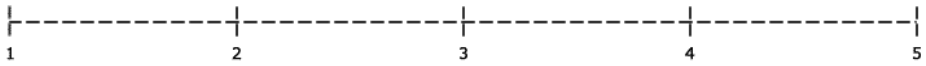
Domain 5: Reflecting on one's own occupation

13. I understand the role and functions expected of me by multi-healthcare professionals.
14. I understand the role and functions I am to perform at the facility where I serve as a staff member.
15. I understand that my actions may affect other professionals.

Domain 6: Understanding other professions

16. I understand the role and functions of other professionals at the facility where I serve as a staff member.
17. I understand the concept of values that other professionals tend to have.
18. I understand the work environment in which other professionals operate.

2) For the following 1-20 items, be sure to choose one from 1, 2, 3, 4, or 5 and select the appropriate number.



Strongly disagree Neither Strong agree

1. Staff members appear to be willing to do whatever it takes to fulfill their roles.
2. There is a strict requirement to follow the organization's policies and regulations.
3. The staff does a very good job.
4. Managers (department heads and section managers) may scold, but rarely praise.
5. What must be done that day is explained to the staff in detail.
6. If the work is not done immediately, something is likely to be said about it.
7. The agenda for the meeting is well organized and general.
8. There is a tendency in organizations to ignore the existence of individuals.
9. The attention and guidance of middle management extends to the details.
10. The manager is rather constantly checking on the staff.
11. The results of the meeting are always applied to the next job.
12. Many staff members consider organizational traditions and customs to be quite compulsory.
13. Each employee has important responsibilities.
14. Be able to express his/her opinion without the supervision of the manager.
15. Managers always try to treat their subordinates fairly.
16. Employees are granted the freedom to do as they please.
17. The organization is very interesting.
18. The manager tries to integrate himself/herself into the staff.
19. Few people in the organization are willing to work on their own initiative.
20. Staff members always feel pressured to do their jobs.

3) We would like to ask you about the response to complex healthcare issess in your area or facility. Where would you place your confidence/satisfaction/level of burden in responding to the complex healthcare issues you are currently facing?

Confidence level:
Not at all confident ——————————— Very confident

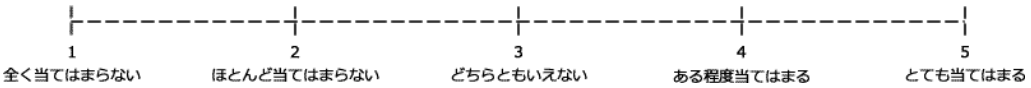
Satisfaction:
Not satisfied at all ——————————— Very satisfied

Burden Level:
Very burdensome ——————————— Not burdensome at all

Tell us about yourself.
4) What is your age? ( ) years
5) What is your gender? Male Female
6) What is your facility affiliation?
University hospitals, Hospitals with over 500 beds, Hospitals with 100-499 beds, Hospitals with 20-99 beds, Clinics with beds, Clinics without beds, Visiting nurse stations, Community comprehensive support centers, Health centers, Long-term care medical facilities (hospitals), Long-term care medical facilities (clinics), Long-term care health facilities for the elderly, Welfare facilities for the elderly, Helper stations, Government (not including community comprehensive support centers and health centers) Elementary/Junior high schools/High schools, Universities, Others (free answers)
7) What is the location (prefecture) of your institution?
8) What is your job title?
Physician, Public health nurse/nurse, Pharmacist, Dentist, Dental hygienist, Physical therapist, Occupational therapist, Speech therapist, Radiologic technologist, Clinical technologist, Long-term care support specialist, Social worker, Psychologist, Dietitian, Psychiatric social worker, Care worker, Other (free text)
9) How many years of professional experience do you have? Please include periods of maternity leave and other leaves of absence. ( ) years
10) How long have you been employed at the hospital/clinic/facility to which you currently belong? Please include periods of leave such as maternity leave. ( ) years
11) What type of work do you do at your current place of employment? Full-time, Part-time
12) Please indicate whether or not you have experience in administrative duties (coordinating staff work, managing personnel, etc.) in your current workplace. Yes No
13) Please indicate whether or not you have received interprofessional education at a university or training school. Yes No
14) Please tell us whether you have had any experience with interprofessional education in your organization or community (e.g., case study meetings, community comprehensive care meetings, etc.). Yes No

Web 調査票（日本語）

1）あなたが現在所属している組織での普段の多職種との関わりを振り返り、下記の各質問について、最も当てはまる数字を選択して下さい。



*他職種は自分以外の職種を、多職種は自らの職種を含めた様々な職種のことを意味しております。

ドメイン 1：患者・利用者・家族・コミュニティ中心

1. 私は、自分が把握している患者・利用者・家族の価値観や関心事を、多職種に伝えている。
2. 私は患者・利用者・家族を中心とした治療やケアの目標を多職種と話し合っている。
3. 私は患者・利用者・家族に伝えた内容について、治療やケアに関わる多職種と共有している。

ドメイン 2：職種間コミュニケーション

4. 私は自職種が把握している情報を、多職種に伝えている。
5. 私は多職種の役割や意見を尊重した返答または問いかけをしている。（非言語コミュニケーション含む）
6. 私は自職種の見解を、他職種にも理解できる言葉で説明している。

ドメイン 3：職種としての役割を全うする

7. 私は自職種がもつ一般的な知識や価値観を、他職種に伝えている。
8. 私は患者・利用者に対して、多職種の中で自職種の役割を果たしている。
9. 私は多職種から求められる自職種の役割を担っている。

ドメイン 4：関係性に働きかける

10. 私は多職種と対等な関係を作っている。
11. 私は多職種と一緒に成長している。
12. 私は多職種との対人葛藤を予防している。

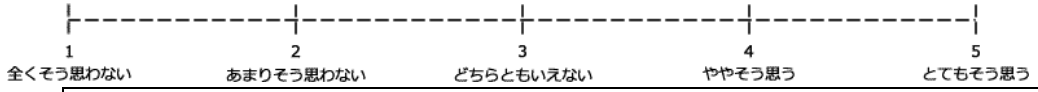
ドメイン 5：自職種を省みる

13. 私は多職種が期待する自職種の役割を理解している。
14. 私は自施設における自職種の役割を理解している。
15. 私は他職種に影響しうる自職種の行動を理解している。

ドメイン 6：他職種を理解する

16. 私は自施設における他職種の役割を理解している。
17. 私は他職種が持ちやすい価値観について理解している。
18. 私は他職種が働く職場環境について理解している。

2)次の1～ 20 問について，1，2，3，4，5の中から必ず1つ選び，該当する番号を選択して下さい。



1. 職員には、何が何でも自分の役割を果たそうとする姿勢が見受けられる。
2. 組織の方針や規則に従うように、厳しい要請がある。
3. 職員はたいへんよく仕事をしている。
4. 管理者（部長、課長）は叱ることはあってもほめることはまれである。
5. その日に行わなければならないことは、詳細な点まで職員に説明されている。
6. 仕事はすぐにやらないと、何か言われそうである。
7. ミーティングの議題は、よく整理され全般に及んでいる。
8. 組織には、個人の存在を無視するような風潮がある。
9. 中間管理職の注意や指導は、詳細な点まで及んでいる。
10. 管理者は、どちらかといえば絶えず職員をチェックしている。
11. ミーティングの成果は、必ず次の仕事に生かされている。
12. 組織の伝統や習慣は、かなり強制的なものと考えている職員が多い。
13. 職員には、それぞれ重要な責任がもたされている。
14. 管理者にきがねなく、自分の意見を述べることができる。
15. 管理者は、常に部下を公平に扱おうとしている。
16. 職員には、好きなようにする自由が認められている。
17. 組織は大変おもしろい。
18. 管理者は、自ら職員にとけ込もうとしている。
19. 組織には、自ら進んで仕事をしようとする者は少ない。
20. 職員は仕事をする上で、いつも圧迫を感じている。

3）あなたが所属している地域あるいは施設での複雑な問題への対応についてお聞きします。あなたが今感じている複雑な問題への対応についての自信度・満足度・負担度はどの位置にありますか？

自信度：
全く自信がない ——————————— とても自信がある

満足度：
全く満足していない ——————————— とても満足している

負担度：
とても負担が大きい ——————————— 全く負担はない

あなたのことについて教えて下さい。
4）年齢を教えて下さい。（　　）歳
5）性別を教えて下さい。　男性　女性
6）所属している施設を教えて下さい。
大学病院、500床以上の病院、100-499床の病院、20-99床の病院、有床診療所、無床診療所、訪問看護ステーション、地域包括支援センター、保健センター、介護療養型医療施設（病院）、介護療養型医療施設（診療所）、介護老人保健施設、介護老人福祉施設、ヘルパーステーション、行政（地域包括支援センターや保健センターを含まない）、小・中・高等学校、大学、その他（自由記載）
7）所属している施設の所在地（都道府県）を教えて下さい。
8）職種を教えて下さい。
医師　保健師・看護師　薬剤師　歯科医　歯科衛生士　理学療法士
作業療法士　言語聴覚士　放射線技師　臨床検査技師　介護支援専門員
社会福祉士　心理職　管理栄養士　精神保健福祉士　介護福祉士
その他　（自由記載）
9）専門職としての経験年数を教えて下さい。※産休などの休職期間なども含めて、記載して下さい。（　　）年
10）現在所属している病院・診療所・施設等への勤続年数を教えて下さい。※産休などの休職期間なども含めて、記載して下さい。（　　）年
11）今の職場での勤務形態を教えて下さい。
常勤　非常勤
12）今の職場での管理業務（職員の業務の調整、人事管理など）の経験の有無を教えて下さい。
あり　なし
13）大学や養成校で多職種連携教育を受けた経験の有無を教えて下さい。
あり　なし
14）組織や地域で多職種連携教育を受けた経験の有無（事例検討会や地域包括ケア会議など）を教えて下さい。
あり　なし

Sensitivity analysis

Satisfaction: threshold value of 50%				**Satisfaction: threshold value of 40%**				**Satisfaction: threshold value of 60%**			
Variable	OR	95% CI	P value	OR	95% CI		P value	OR	95% CI		P value
Age	1.006	0.985 to 1.027	0.596	1.055	0.995	1.042	0.125	0.998	0.977	1.019	0.825
Gender (Female:1)	0.859	0.569 to 1.298	0.47	0.5	0.634	1.555	0.975	0.67	0.441	1.018	0.06
Profession (nurse:1)	0.727	0.449 to 1.179	0.196	0.709	0.402	1.123	0.129	0.727	0.433	1.222	0.229
PDS factor	**1.121**	**1.076 to 1.167**	**<0.001**	**1.057**	**1.076**	**1.173**	**<0.001**	**1.081**	**1.038**	**1.125**	**<0.001**
Do factor	**0.955**	**0.922 to 0.989**	**0.01**	**0.962**	**0.913**	**0.983**	**<0.001**	**0.933**	**0.899**	**0.969**	**<0.001**
Administrative experience	1.602	1.070 to 2.400	0.022	1.469	1.05	2.521	0.029	**1.857**	**1.226**	**2.813**	**<0.001**
JASSIC	**1.03**	**1.009 to 1.052**	**0.005**	1.082	0.999	1.044	0.056	**1.052**	**1.028**	**1.077**	**<0.001**
Confidence: threshold value of 50%				**Confidence: threshold value of 40%**				**Confidence: threshold value of 60%**			
Variable	OR	95% CI	P value	OR	95% CI		P value	OR	95% CI		P value
Age	**1.052**	**1.028 to 1.076**	**<0.001**	**1.055**	**1.027**	**1.084**	**<0.001**	**1.029**	**1.027**	**1.084**	**0.008**

Gender (Female:1)	**0.404**	**0.262 to 0.623**	**<0.001**	**0.500**	**0.304**	**0.822**	**<0.001**	**0.439**	**0.304**	**0.822**	**<0.001**
Profession (nurse:1)	1.166	0.713 to 1.908	0.54	0.709	0.410	1.227	0.219	0.936	0.41	1.227	0.787
PDS factor	1.025	0.986 to 1.067	0.212	**1.057**	**1.010**	**1.107**	**0.016**	1.014	1.01	1.107	0.473
Do factor	**0.947**	**0.914 to 0.982**	**0.003**	0.962	0.923	1.003	0.067	**0.956**	**0.923**	**1.003**	**0.010**
Administrative experience	1.296	0.855 to 1.963	0.222	1.469	0.900	2.399	0.124	**1.757**	**0.9**	**2.399**	**0.005**
JASSIC	**1.074**	**1.049 to 1.099**	**<0.001**	1.082	1.054	1.111	**<0.001**	1.067	**1.054**	**1.111**	**<0.001**

*Binomial logistic analysis of the association with **more satisfaction, and the more confident group about complex issues**. Bold text indicates a statistically significant correlation with a p-value less than 0.17.

OR, odds ratio; CI, confidence interval; JASSIC, Japanese version of the Self-assessment Scale of Interprofessional Competency; PDS factor, “Plan, Do, See” action for management; Do factor, top-down management style, such as in a leader-centered organization

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Title page, P1 abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	P1-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	P4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	P5
Methods			
Study design	4	Present key elements of study design early in the paper	P6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	P6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	P6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	P7-9
Data sources/ measurement	8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	P7-9
Bias	9	Describe any efforts to address potential sources of bias	P6
Study size	10	Explain how the study size was arrived at	P10
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	P9-10
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	P9-10
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	N/A
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	P6
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	P11
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	P11, Table 1-4
		(b) Indicate number of participants with missing data for each variable of interest	N/A

Outcome data	15*	Report numbers of outcome events or summary measures	P11-12, Table 4
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	P12, Table 3-4
		(*b*) Report category boundaries when continuous variables were categorized	P12
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	P12, Table 4
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	P13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	P16
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	P13-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	P17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Title page

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

Supplemental Table 1. Univariate analyses of the association of the subjective perceptions by sociodemographic characteristic

Characteristic	**Satisfaction**			**Confidence**			**Burden**		
Sociodemographic characters	Higher satisfaction (n=359)	Lower satisfaction (n=234)	p-value	More confident (n=388)	Less confident (n=205)	p-value	Heavier burden (n=328)	Lighter burden (n=265)	p-value
Mean age (years), Mean (SD)	42.5 (10.1)	41.0 (9.9)	0.074	43.5 (9.8)	38.9 (9.8)	<0.001	42.2 (10.1)	41.6 (9.9)	0.525
Female, n (%)	176 (49.0)	136 (58.1)	0.030	182 (46.9)	130 (63.4)	<0.001	170 (51.8)	142 (53.6)	0.670
Mean years of experience (years), Mean (SD)	16.6 (9.8)	16.0 (9.6)	0.442	17.8 (9.8)	13.7 (8.9)	<0.001	16.6 (9.5)	16.2 (9.9)	0.601
Mean years of experience working at the current institution (years), Mean (SD)	9.4 (8.6)	8.9 (7.8)	0.556	9.6 (8.7)	8.4 (7.4)	0.098	9.5 (8.5)	8.8 (7.9)	0.269
Attendance type (regular), n (%)	336 (93.6)	221 (94.4)	0.671	365 (94.1)	192 (93.7)	0.841	307 (93.6)	250 (94.3)	0.707

Administrative experience (yes), n (%)	210 (58.5)	94 (40.2)	<0.001	228 (58.8)	76 (37.1)	<0.001	161 (49.1)	143 (54.0)	0.237
Profession (including duplicates)									
Public health nurses and nurses, n (%)	70 (19.5)	63 (26.9)	0.034	83 (21.4)	50 (24.4)	0.405	79 (24.1)	54 (20.4)	0.282
Total JASSIC score									
Mean (SD)	73.6 (8.9)	68.2 (10.3)	<0.001	74.0 (8.6)	66.6 (10.2)	<0.001	71.4 (9.9)	71.5 (9.8)	0.857
PDS Factor									
Mean (SD)	33.5 (5.7)	28.8 (5.3)	<0.001	32.7 (6.0)	29.6 (5.6)	<0.001	31.7 (6.0)	31.5 (6.1)	0.702
Do Factor									
Mean (SD)	25.2 (5.9)	29.1 (6.4)	<0.001	25.8 (6.4)	28.5 (6.1)	<0.001	26.6 (6.5)	26.9 (6.3)	0.640

Abbreviations: SD, standard deviation. JASSIC, Japanese version of the Self-assessment Scale of Interprofessional Competency; PDS factor, “Plan, Do, See” action for management; Do factor, top-down ordering of work, such as in a leader-centered organization.