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BRIEF REPORT

Suggestions for new organizational-level item pools for the national Stress Check Program from management philosophy and mission statement: A qualitative study using unsupervised learning

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Abstract

Objective: This study aimed to obtain suggestions for new organizational-level item pools that companies could utilize to accomplish management philosophy and mission statements in the context of survey and work environment improvements for the national Stress Check Program.

Methods: A qualitative study was conducted using unsupervised learning. A large amount of text data related to management philosophy and mission statements were collected, that is, management messages described on the websites of all companies listed on the Tokyo Stock Exchange. For the main analysis, topic modeling was performed on the nouns from the management messages using Latent Dirichlet Allocation (LDA) to build a model consisting of 10 latent topics, each represented by a group of the 10 most frequently reoccurring nouns. Each group of nouns was qualitatively summarized based on the topic model.

Results: In total, 22 524 nouns were extracted from the management messages of 3575 companies. A topic model consisting of 10 latent topics was constructed using the LDA. The suggestion for new item pools included new technologies, business plans/strategies, company shareholders, health/happiness/wealth, profits/sales, development of society, a sustainable society, safety and security, customer/consumer satisfaction, corporate social responsibility, fairness, transparency, and human rights.

Conclusion: The suggestions for potential item pools were derived from management philosophy and mission statement that are not covered in the existing survey. The suggestions could be useful for motivating employers to implement work environment improvement. Future studies need to make definite items and investigate whether they correlate to job stressors and mental health among workers.

KEYWORDS

item pools, LDA, management, organization, workplace

1 | INTRODUCTION

Under the current Stress Check Program in Japan, workplaces with ≥50 employees are encouraged to analyze the data from the program's survey by workgroup and implement work environment improvements based on data analysis. Work environment improvement is a primary approach to the goal of the Stress Check Program to prevent ill mental health. The effectiveness of work environment improvements has been proven to improve psychological distress and work performance among workers.[1,2]

However, many workplaces have not yet been able to improve their work environments. One reason is that the questionnaire used for the Stress Check survey cannot capture the diversity of factors potentially included in work environments. A number of workplaces have tried measuring organizational factors using the New Brief Job Stress Questionnaire,[3] which coveres job stressors (e.g., quantitative job overload), task-, workgroup-, and organizational-level resources (e.g., job control, supervisor support, procedural justice). However, additional item pools are needed to reflect diverse workplace issues. If potential item pools reflect the factors related to the work environment that motivate employers to understand the importance of work environment improvement were available in the survey, the feasibility of work environment improvement could be improved.

Management philosophy and mission statement are interesting for employers, and potentially included in survey items for work environment improvement. They are defined as the central, distinctive, and enduring concepts, beliefs, principles, and attitudes guiding business management, which are critical in the pursuit of an organizational mission.[4] In Japan, various management philosophies and mission statements were observed such as customer orientation, partner orientation, global orientation, entrepreneurship, honesty, and sales effort.[5] Interestingly, previous studies have reported that several types of management philosophy and mission statement were associated with work engagement and performance through adaptation

of, identification with, and sensemaking of management philosophy and mission statement.[6-8] High levels of work engagement and performance are associated with positive mental state and well-being.[8] Thus, item pools that enable us to measure management philosophy and mission statement could motivate employers to implement work environment improvement, and could be useful for improving workers' mental health.

The objective of this study was to obtain suggestions for new organizational-level item pools that companies could utilize to management philosophy and mission statements in the context of survey and work environment improvements of the national Stress Check Program, by a qualitative study using a technique of machine learning (unsupervised learning).

2 | METHODS

2.1 | Study design and data collection

This qualitative study used unsupervised learning. To identify suggestions for the item pools, a large amount of text data related to management philosophy and mission statements was collected. Text data were collected from management messages described on the websites of each of the companies listed in the First, Second, and Mothers sections of the Tokyo Stock Exchange (TSE), and in the Standard and Growth Sections of the Japan Association of Securities Dealers Automatic Quotations (JASDAQ) as of August 8, 2019. Specifically, the data for the analysis consisted of either the "message from top management" posted on the company's home page or the complete text of the page corresponding to the company's management philosophy and mission statement. The Tokyo Stock Exchange Listed Company Information Service[9] was used to search for information on the listed companies. Management messages as management philosophy and mission statements were collected from the websites of 3575 companies

listed on the TSE and JASDAQ. This included 2124 TSE 1st Section, 469 2nd Section and 292 Mothers Section companies, and 657 JASDAQ Standard Section and 33 Growth Section companies. The companies were categorized into 11 industry types based on the Japan Standard Industrial Classification: agriculture, forestry, and fisheries (11); mining (5); construction (157); manufacturing (1431); electricity/gas (24); information and communication (436); transport (111); wholesale/retail trade (661); finance/insurance (166); real estate (130); and service industries (443). Extraction of the text from the company web pages was outsourced to Tokyo Soteria Employment, from August 8 to December 12, 2019.[10] Ethical approval was not obtained because this study did not involve humans, but the text data.

2.2 | Analysis

First, a morphological analysis was conducted to divide the management messages into morphemes. Second, among the morphemes, only the top 1000 nouns used in at least 30% of management philosophy and mission statements were used in the main analysis. For the main analysis, topic modeling using LDA, an unsupervised machine-learning technique, was conducted. LDA can indicate latent topics represented by a series of words that appear frequently in a set of sentences.[11] When a sentence is given, LDA can also calculate the posterior probabilities for what topic a given sentence was about, using Bayesian estimation. In this study, the number of extracted latent topics was set to 10, which is a hyperparameter that should be tuned in LDA. Janome version v0.3,[12] for the morphological analysis, and Scikit-learn version 0.21.3[13] for morphological analysis and topic modeling was used, respectively. The extracted 10 topics were qualitatively summarized to make presumed company goals and suggestions for new organizational-level item pools.

3 | RESULTS

From the management messages of 3575 companies, a total of 22 524 nouns were extracted. Among the nouns, the top 1000 words that were used in at least 30% of the management philosophy and mission statements were used in topic modeling. Table 1 shows the word series of the ten latent topics, presumed company goals, and suggestions for new item pools.

The top 10 reoccurring words for latent Topic 1 included *katsuyō* (utilization), *kadai* (issue), *kaiketsu* (resolution), *kanō* (potential), *ryōiki* (domain), *bunya* (field), and *gyōkai* (industry). The management messages

included in the topic referred to the goals of utilizing new technologies as they became available, and to analyze and resolve current issues in the company's industry.

The words related to latent topic 2 included *nengetsu* (years and months), *chūki* (medium-term), *senryaku* (strategy), *kiban* (fundamentals), *kyōka* (strengthening), *kakudai* (expansion), *taisei* (system), and *kabunushi* (shareholder). The management messages included in the topic refer to business plans, medium- and long-term strategies, and gratitude to company shareholders.

The words related to latent topic 3 included *hitobito* (people), *jibun* (oneself), *shiawase* (happiness), *kandō* (excitement), and *sonzai* (presence). Management messages included in the topic refer to the pursuit of happiness, making people's lives wealthier, and finding meaning in their lives.

The words related to latent topic 4 included *rieki* (profit), *uriage* (sales), *tōshi* (investment), *keizai* (economy), and *eigyō* (operations). The management messages included in the topic referred to the profits and sales of the company, and contributed to the development of society through economic activities.

The words related to latent topic 5 included *chikyū* (earth), *jizoku* (sustainability), *kanō* (potential), *enerugī* (energy), *anzen* (safety), *kihon* (fundament), *sutēku* (stake), and *horudā* (holder). The management messages included in the topic referred to trying to preserve the global environment and its resources, contributing to a sustainable society, making people feel safe and secure, and winning the trust of stakeholders.

The words related to latent topic 6 included *kokyaku* (customer), *manzoku* (satisfaction), and *doryoku* (effort). The management messages included in the topic referred to the importance of business customer satisfaction and the constant effort required to develop the company.

The words related to latent Topic 7 included "*okyaku*" "*sama*" (together these are the honorary form of 'customer', *minasama* (an honorary form of 'everyone'), *kenkō* (health), *iyakuhin* (drugs), *kanja* (patient), and *chiryō* (treatment). The management messages included in the topic referred to consumer satisfaction, contributing to society through the treatment of disease, and the promotion of better health maintenance.

The words related to latent topic 8 included *kenshō* (charter), *mondai* (problem), *tettei* (thorough), *sekinin* (responsibility), and *kōsei* (fairness). The management messages included in the topic referred to corporate social responsibility, quickly resolving problems when the company violates the charter, and the importance of fair competition in company management practices.

The words related to latent topic 9 included *mēkā* (manufacturer), *mono* (goods), and *seisan* (production). The management messages included in the topic referred

TABLE 1 Latent topic, presumed company goals, and suggestions for new item pools

No	10 most frequently occurring nouns for each latent topic (word count)	Presumed company goals	Suggestions for new item pools
1	utilization (1141), issue (1509), resolution (1025), potential (1562), domain (998), field (1810), industry (1430), variety (1024), necessity (1479), human resources (991)	- Utilization of new technologies - Resolution of domain- or industry-related issues	- The organization utilizes new technologies - Resolving issues faced by the industry is a priority for the organization
2	years and months (1482), strengthening (1538), expansion (1765), corporation (1179), fundamentals (1180), system (1133), shareholder (1705), strategy (966), medium-term (825), promotion (1404)	- Medium and long-term company growth - Stability of business operations & earnings - Maximization of shareholder value	- Medium and long-term growth are a priority for the organization - Stability of operations is a priority for the organization - Shareholder value is a priority for the organization (organizational level)
3	people (1731), that (1533), importance (1471), work (1184), many (1335), oneself (737), happiness (722), excitement (705), all (1262), presence (1259)	- People being happy and having meaningful lives	- People's happiness is a priority for the organization - People having meaningful lives is a priority for the organization
4	profit (1434), fiscal year (859), sales (598), investment (1111), housing (459), economy (1202), business operations (840), years and months (1482), consolidation (327), store (715)	- Maximize sales and profits - Maximize the company's contribution to the economy	- Company profits are a priority for the organization - Contributing to society through economic activity is a priority for the organization (organizational level)
5	earth (1213), sustainability (1316), safety (2216), fundament (1686), energy (681), holder (1101), stake (1094), potential (1562), policy (1194), making (2171)	- Preservation of the global environment and its resources - Contributing to a sustainable society - People's safety and security - Stakeholder trust	- Trying to preserve the global environment and its resources is a priority for the organization - Contributing to the sustainability of society is a priority for the organization - People's safety and security are a priority for the organization - Stakeholder trust is a priority for the organization
6	production (1381), customer (1803), satisfaction (1688), logistics (527), industry (1430), field (1810), effort (1099), making (2171), necessity (1479), manufacturer (917)	- Business customer satisfaction - Constant effort	- Business customer satisfaction is a priority for the organization - Always making an effort is a priority for the organization
7	customer (2206), health (1169), everyone (851), drugs (281), patient (261), issue (1509), finance (801), treatment (186), maintenance (1316)	- Consumer satisfaction - Contributing to the health maintenance and treatment of patients with illnesses	- Consumer satisfaction is a priority for the organization - People's health is a priority for the organization
8	safety (2216), proactivity (1587), problem (896), thorough (746), charter (276), personally (989), fairness (821), construction (266), security (1264), responsibility (1294)	- Social accountability - Fair company management practices in regard to competition - How problems that have occurred with the company are addressed	- Socially accountable behavior is a priority for the organization - Fair management practices in regard to competition are a priority for the organization - The organization is able to quickly address internal problems when they occur
9	making (2171), manufacturer (917), field (1810), car (578), parts (361), expectations (1466), goods (604), production (1381), equipment (257), domestic (913)	- Contributing to society by producing new products	- Contributing to society through making things is a priority for the organization

TABLE 1 (Continued)

No	10 most frequently occurring nouns for each latent topic (word count)	Presumed company goals	Suggestions for new item pools
10	relationship (1508), compliance (911), laws (777), respect (1158), appropriateness (507), norms (604), fairness (821), employment (1205), workplace (666), disclosure (470)	- Fairness, transparency - Compliance with laws and norms - Respect for human rights	- Fairness and transparency are a priority for the organization - Compliance with laws and norms are a priority for the organization - Respect for human rights is a priority for the organization

to the goals of making society greater comfortable by producing new products.

The words related to latent topic 10 included *kōsei* (fairness) and *kaiji* (disclosure). *Junshu* (compliance), *hōrei* (laws), *kihan* (norms), and *sonchō* (respect). The management messages included in the topic referred to ensuring fairness and transparency of information within a company, fulfilling corporate responsibility to comply with laws and regulations, and respecting human rights.

In summary, the suggestion for new item pools included new technologies, business plans/strategies, company shareholders, health/happiness/wealth, profits/sales, development of society, a sustainable society, safety and security, customer/consumer satisfaction, corporate social responsibility, fairness, transparency, and human rights.

4 | DISCUSSION

The topic models developed in this study provide suggestions for new organizational-level item pools that could potentially be used in national stress check programs. Most of these factors are consistent with the previous report of management philosophies,[5] and not currently measured in existing scales.[3] The suggested factors could be included in the item pool from which companies could select items to use when implementing their stress check survey and work environment improvements. For example, the items would be useful whether the workplace emphasizes employees' happiness and meaningful lives, whether it contributes to a sustainable society, and whether workplace keeping emphasizes people's health. Some of these philosophies and missions may reflect social expectancies, while others may be universal. Not all suggestions can directly relate to employees' health and performance, however, some of them could be effective to improve work environments and workers' health through adaptation of the philosophies.[6-8] Further studies are needed to examine the relationship between the scores of potential item pools and mental health of workers.

The topic model developed from the management messages showed what the company considered important, thereby providing suggestions on what company goals may be. Therefore, in the job stress model, they may be treated as organizational stress-related factors. For example, the presumed goals of Topic 3 can be "people being happy and having meaningful lives," and suggestions for the Stress Check survey might include whether the workplace emphasizes employees' happiness and meaningful lives. The presumed goals from Topic 5 can be "preservation of the global environment and its resources," "contributing to a sustainable society," and "people's safety and security." Subsequently, suggestions might be made for organizational-level survey items to ask whether the workplace contributes to preserving the global environment and its resources, sustainable society, and people's safety. The presumed goals from Topic 7 can be "consumer satisfaction" and "contributing to society through the treatment of disease and the promotion of better health maintenance." Subsequently, suggestions may be made for organizational-level survey items to ask whether workplace keeping emphasizes people's health. Mental health and well-being would improve in the workplaces where these goals were important. Including item pool items for these topics could allow companies to assess factors related to their goals.

This study has several limitations. First, only one source (i.e., management messages) was used for the text data of the management philosophy and mission statements. However, a few goals may have been missed. In addition, the judgment of whether the sentences are considered management messages might be biased by people performing the data input from the company website. Finally, the setting of the hyperparameters for topic modeling (number of words to use and number of latent topics to identify), presumed company goals, and suggestions for potential item pools were also biased by the first author.

In conclusion, suggestions for potential item pools were derived from management philosophy and mission statement that are not covered in the existing survey. The suggestions could be useful for making items to measure the work environment that motivates employers to

implement work environment improvement. Future studies need to make definite items and investigate whether they correlate to job stressors and mental health among workers.

CONFLICT OF INTEREST
KW, AI, HE, NI, YO, and AT declare there is no conflict of interest for the present study.

AUTHOR CONTRIBUTIONS
KW has contributed to the research design, analysis, and writing the draft. AI, HE, NI, YO, and AT had significant contributions to the revision of the draft and all of them approved the current manuscript.

DATA AVAILABILITY STATEMENT
Data are available upon reasonable request.

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ここは押さえておきたい！①
データの分析と活用のポイント

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● はじめに

　労働者数 50 人以上の事業場を対象にストレスチェック制度が義務化されてから 6 年半が経過し、義務化の当初から本制度を実施している事業場では、現在 7 回目の実施に取り組まれていることと思います。その間、事業場によっては、本制度に独自の工夫を加え、労働者のメンタルヘルス不調の一次予防に積極的に取り組んでこられたものと思います。一方で、「労働安全衛生法に基づくストレスチェック制度実施マニュアル」[1] で推奨されている方法（以下、これを「標準的な方法」と表記します）で本制度を実施しているものの、労働者のメンタルヘルス不調の一次予防に十分に活用できていない事業場も少なくないのではないでしょうか。

　標準的な方法でストレスチェック制度を実施することも意義のある重要な取り組みではありますが、データ分析をうまく活用し、事業場の実情に合わせてカスタマイズすることで、より現場に即した一次予防の取り組みを行うことができるようになります。本稿では、「高ストレス者の選定」と「集団分析」の 2 つの場面におけるデータ分析の方法や活用のポイントについて説明します。

● 高ストレス者の選定

1）標準的な方法とその科学的根拠

　ストレスチェックで高ストレス者を選定する際の標準的な方法は、「職業性ストレス簡易調査票」[2] を使用し、㋐「心身のストレス反応」（B 項目）の合計点（得点範囲：29〜116 点）が 77 点以上の者、㋑「心身のストレス反応」の合計点が 63〜76 点で、かつ「仕事のストレス要因」（A 項目）＋「周囲のサポート（の不足）」（C 項目）の合計点（得点範囲：26〜104 点）が 76 点以上の者を「高ストレス者」とする方法です（図 1）。ここで示されている数値基準（カットオフ値）は、多職種からなる既存の大規模データに基づき、㋐＋㋑の割合が全受検者（全回答者）の約 10％になるように設定されたものです。

　この数値基準を用いて高ストレス者と判定された労働者は、高ストレス者でないと判定された労
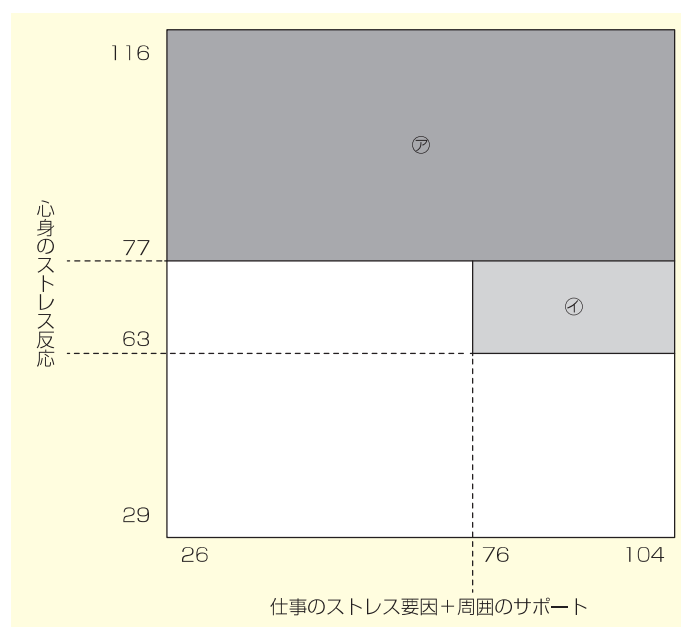
図1 標準的な高ストレス者の判定基準

（文献1より作成）

働者に比べて、1カ月以上の長期疾病休業に至る
リスクが男性で6.59（95％信頼区間：3.04〜
14.25）倍、女性で2.77（95％信頼区間：1.32〜
5.83）倍[3]、離職に至るリスクが男性で2.86（95
％信頼区間：1.74〜4.68）倍、女性で1.52（95％
信頼区間：1.29〜1.78）倍[4]であることが報告さ
れており、標準的な方法によって判定した「高ス
トレス」は、その後の心身の不調や離職を強く予
測することが明らかになっています。

2）選定方法のカスタマイズ：ポイントと留意点

　上記の知見を踏まえると、標準的な方法で高ス
トレス者を選定することも、科学的根拠に基づく、
意義のある選定方法であると言えます。しかしな
がら、この方法を用いた場合、事業場によっては、
高ストレス者が全受検者の10％を大幅に上回る
（あるいは、大幅に下回る）ことがあり、高スト
レス者をうまく選定できない場合も少なくありま

せん。また、高ストレス者の選定割合を全受検者
の10％程度に設定するのは、あくまでも目安に
すぎません。ストレスチェック制度の実施に際し
ては、必ずしも標準的な方法に従って高ストレス
者を選定する必要はなく、各事業場の実情に合わ
せて、独自に高ストレス者の選定割合や選定する
際の数値基準を設定することができます。

　たとえば、高ストレス者の選定割合を高めに設
定し、メンタルヘルス不調の疑いがある（あるい
は、将来的に不調に陥るリスクがある）労働者を
広く拾い上げたい場合は、前述の㋐や㋑で示した
「心身のストレス反応」や「仕事のストレス要因」
＋「周囲のサポート（の不足）」の数値基準を低
く設定することになります。逆に、高ストレス者
の選定割合を低めに設定し、メンタルヘルス不調
が強く疑われる（あるいは、将来的に不調に陥る
リスクが高い）労働者を中心に拾い上げたい場合

は、これらの数値基準を高く設定することになります。

その際に注意しなければならないのが、感度と特異度の「トレード・オフ」の関係です。メンタルヘルス不調の有無を外的基準とした場合、「感度」は「メンタルヘルス不調者を高ストレス者と判定する確率」、「特異度」は「メンタルヘルス不調でない者を高ストレス者でないと判定する確率」を指します。たとえば、数値基準を低く設定した場合、メンタルヘルス不調者は、より高い確率で高ストレス者と判定されることになるため、感度は上がりますが、同時に、メンタルヘルス不調でない者も高ストレス者と判定される確率が高くなるため、特異度は下がることになります。同様の原理で、数値基準を高く設定した場合、特異度は上がりますが、感度は下がることになります。

このように、感度と特異度は同時に上げることができないため、どのように数値基準を設定しても、高ストレス者として拾い上げられないメンタルヘルス不調者や、メンタルヘルス不調ではない（あるいは、将来的に不調に陥るリスクが低い）のに高ストレス者として拾い上げられてしまう労働者が一定数出てきてしまうことは、調査上の限界として理解しておく必要があります。その限界を踏まえた上で、感度と特異度の和が最大値になるときの得点を算出し、その得点を数値基準に設定する方法があります。このような、感度と特異度が共に低くなりすぎない「よい落としどころ」となる得点のことを「最適カットオフ値」と言います。

先行研究では、メンタルヘルス不調の有無（精神的健康度の自記式評価尺度 K6 の得点が 13 点以上かどうかで判定）[5] を外的基準とした場合、㋐「心身のストレス反応」の数値基準を 65 点、

あるいは、㋑「仕事のストレス要因」＋「周囲のサポート（の不足）」の数値基準を 55 点に設定したときに、感度と特異度の和が最大値になることが報告されています。ただし、これらの数値基準を用いた場合、全受検者の約 30％が高ストレス者と判定されてしまうことも報告されているため、事業場でこれらの数値基準をそのまま適用するには注意が必要です[6]。

このように、事業場で独自に高ストレス者を選定する際の数値基準を設定する場合、過去のストレスチェックや人事データを活用して、①何を主要な（予防したい）アウトカムに設定するのか（例：うつ病の発症、長期疾病休業、離職など）、②全受検者の何％を高ストレス者に選定するのかを検討し、③設定したアウトカムを外的基準として数値基準を変化させた場合に、感度、特異度、高ストレス者の選定割合がどのように変化するのかを確認することがポイントになります。

3）医師による面接指導の申出勧奨への活用

ここまで、高ストレス者を選定する際のデータ分析の活用方法について説明しましたが、高ストレス者に対して医師による面接指導の申出を勧奨する場面でもデータ分析を活用することができます。高ストレス者が面接指導を申し出る割合は、未だ低い水準で推移していますが、高ストレス者の判定には用いられていない他の指標を組み合わせることで、高ストレス者の中から、面接指導の申出を勧奨する優先度が高い労働者を抽出することができます。

そのひとつが職務満足度（職業性ストレス簡易調査票では D 項目で測定）への回答内容を活用する方法です。職務不満足がその後の疾病休業を強く予測することはよく知られていますが[7]、近年の研究では、標準的な方法で判定された「高ス

8.0
7.0
6.49*
6.0
5.01*
5.0
4.0
3.0
2.16*
2.0
1.00
1.0
0.0

ハザード比

非高ストレス＋満足
（n = 10,708）

非高ストレス＋不満足
（n = 2,462）

高ストレス＋満足
（n = 431）

高ストレス＋不満足
（n = 1,086）

■ 参照　■ 職務不満足　■ 高ストレス　■ 職務不満足×高ストレス

*p<0.05 (性別, 年齢, 勤続年数, 職位, 職種で調整)
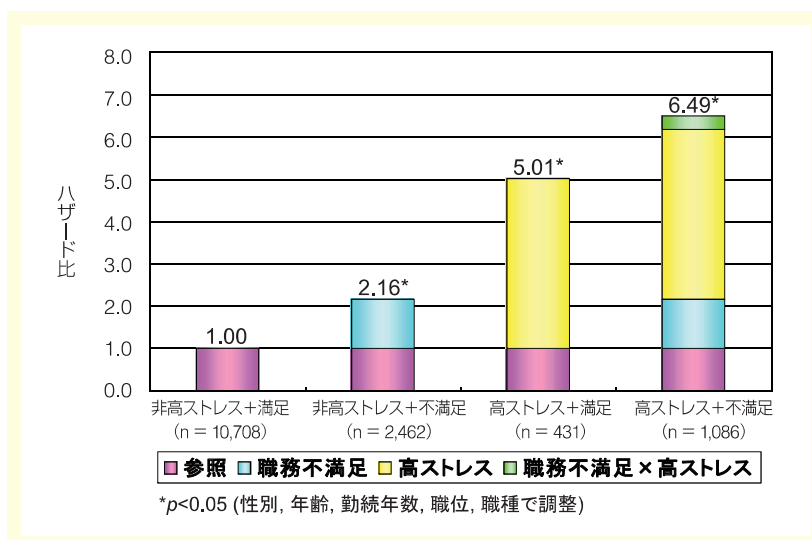
図2　高ストレスと職務不満足の組み合わせによる長期疾病休業のリスク

（文献8より作成）

トレス」に職務不満足が重なることで、その後の長期疾病休業のリスクが相加的に増大することが明らかになっています（図2）[8]。高ストレス者に対して面接指導の申出を勧奨する際、職務満足度への回答内容は、より強く申出を勧奨するかどうかを判断するための有用な情報になると考えられます。ただし、図2に示されている通り、「高ストレス＋満足」群の長期疾病休業のリスクも高いことから、「仕事に満足／まあ満足」と回答している高ストレス者に対する申出の勧奨が疎かにならないよう、留意する必要があります。

今回ご紹介した活用方法はあくまでも一例ですが、職務満足度だけでなく、職業性ストレス簡易調査票以外の補足的な指標（たとえば、定期健康診断の問診票で把握している睡眠問題の有無など）[9]と「高ストレス」の判定とを組み合わせることで、その後の心身の不調をより強く予測することができる可能性があります[10]。

● 集団分析

1）標準的な方法とその科学的根拠

ここからは、ストレスチェック制度で努力義務となっている集団分析の場面におけるデータ分析の方法や活用のポイントについて説明します。

集団分析を行う際の標準的な方法は「仕事のストレス判定図」[11]を用いる方法です。すでに多くの事業場で活用されているものと思いますが、今一度おさらいをすると、職業性ストレス簡易調査票の項目のうち、

・心理的な仕事の負担（量）（A項目の1〜3）
・仕事のコントロール度（A項目の8〜10）
・上司からのサポート（C項目の1、4、7）
・同僚からのサポート（C項目の2、5、8）

の4つの指標の各平均値を判定図中にプロットし「健康リスク」を算出するものです。

健康リスクの算出に用いられている予測式は、多職種からなる大規模データに基づき、心理的ス

トレス反応、疾病休業、医療機関への受診などのさまざまな指標をアウトカムとして立てられたものですので、健康リスクは「当該集団において、種々の健康問題が発生するリスクが全国平均に比べてどれくらい高いのか（あるいは、低いのか）を科学的根拠に基づいて算出したもの」と言うことができます。

2) 集団分析のカスタマイズ：ポイントと留意点

前述の通り、仕事のストレス判定図は、対象集団における健康問題の発生リスクを具体的な数値として算出することができるため、直感的に理解しやすいというメリットがあります。一方で、分析に用いられている指標が4つに限定されているため、より包括的に対象集団の状況を把握するには、仕事のストレス判定図には用いられていない、その他の指標を分析する必要があります。

分析を行うに際し、まずは分析方法を検討する必要があります。その中で最も基本的な方法は、各指標の平均値を算出する方法です。職業性ストレス簡易調査票では、指標によって取りうる得点範囲が異なりますが、たとえば、各指標の得点範囲が1～4点になるようにそろえることによって、指標間で得点を比較できるようになり、対象集団の「強みになっている側面」や「改善していきたい側面」を把握しやすくなります。一方で、同じ平均値であっても、回答分布が大きく異なっている場合も少なくありません。その場合、標準偏差を一緒に算出するのもひとつの方法です。標準偏差を算出することで、当該指標に対して、回答者の多くが平均値に近い評価をしていたのか、回答者によって評価にバラツキがあったのかを把握することができ、改善のアプローチ方法（リスクの高い特定の小集団にアプローチするのか、集団全体にアプローチするのか）を検討する際にも有用

な情報になります。

上記のような基本統計量を算出する方法に加え、主要な（予防したい）アウトカムを設定し、各指標の得点とアウトカムの発生との関連を分析する方法もあります。たとえば、疾病休業を予防する対策を行いたい場合、ストレスチェックの結果と人事データを活用して、各指標の得点と疾病休業の発生との関連を検討し、指標間で関連の強さを比較することで、より優先的に改善すべき指標を明確にすることができます。

次に、分析単位を検討する必要があります。集団分析では、どうしても「部」や「課」といった部署単位の分析を想像しがちですが、必ずしも部署単位にとらわれる必要はありません。たとえば、年代、職位、職種、勤務形態、雇用形態など、さまざまな基本属性を分析単位とすることで、どのような属性の労働者がどのようなストレスを抱えているのかを把握することができ、より全体像をとらえやすくなります。部署単位の集団分析では、「少人数の部署では集団分析ができず、不公平感が生じやすい」「多職種からなる部署では集団分析が難しい」といった声がよく聞かれますが[12]、基本属性を分析単位とすることで、自身の回答が集団分析に用いられないことに対する不公平感の解消につながる可能性があります。また、職種そのものを分析単位とすることで、より豊富な情報を得られるかもしれません。

最後に、分析結果をどのように報告するか（見せるか）を検討する必要があります。最も一般的な方法は、図やグラフといった視覚的にわかりやすい形にまとめる方法です（仕事のストレス判定図は、その代表例であると言えます）。このような視覚化された資料は、統計の知識の多寡にかかわらず、多くの人が直感的に全体像を把握しやす

いというメリットがありますが、事業場によっては、より詳細な結果報告を求められる場合もあります。たとえば、研究開発を主な事業としている事業場では、普段から統計分析に慣れ親しんでいる労働者が多いため、基本統計量や点推定だけでなく、p値や95％信頼区間、効果量など、より厳密に分析結果を評価できる統計量の報告を求められるかもしれません。逆に、分析結果を詳細に見る余裕がない事業場では、分析結果から読み取れる重要なポイントや課題点をピックアップして報告することが求められるかもしれません。「分析結果を活用し、職場環境の改善につなげていくこと」が集団分析の目的であることを考慮すると、分析結果の報告に際し、事業場のニーズを事前に把握しておくことは極めて重要であると言えます。

このように、集団分析を行う際には、①何をどのように、②どういう単位で分析し、③どのような形で分析結果を報告するのか、を検討しておく必要があります。その際、衛生委員会などでの調査審議に加えて、人事労務担当者や管理監督者に意見聴取を行うことで、より効率的に事業場のニーズに即した分析計画を立てることができるようになります。

● おわりに

本稿では「高ストレス者の選定」と「集団分析」の2つの場面におけるデータ分析の方法や活用のポイントについて説明しましたが、今回ご紹介した方法はあくまでも一例にすぎません。読者のみなさまの中には、すでにこれ以上の取り組みをされている方も多数いらっしゃるかと思いますが、本稿を通じて、少しでも新たな気付きを得ていただけることを願うとともに、これから本格的にデータ分析を活用していきたいと考えている読者のみなさまにおかれましては、本稿の内容を何らかの形で今後の業務にお役立ていただければうれしく思います。

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Article

The Survey Measure of Psychological Safety and Its Association with Mental Health and Job Performance: A Validation Study and Cross-Sectional Analysis

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Abstract: Objectives: This study validated the Japanese version of O'Donovan et al.'s (2020) composite measure of the psychological safety scale and examined the associations of psychological safety with mental health and job-related outcomes. Methods: Online surveys were administered twice to Japanese employees in teams of more than three members. Internal consistency and test–retest reliability were tested using Cronbach's α and intra-class correlation coefficient (ICC), respectively. Structural validity was examined using confirmatory factor analysis (CFA) and exploratory factor analysis (EFA). Convergent validity was tested using Pearson's correlation coefficients. Multiple linear regression analyses were conducted to examine the relationship between psychological safety and psychological distress, work engagement, job performance, and job satisfaction. Results: Two hundred healthcare workers and 200 non-healthcare workers were analyzed. Internal consistency, test–retest reliability, and convergent validity were acceptable. CFA demonstrated poor fit, and EFA yielded a two-factor structure, with team leader as one factor and peers and team forming the second factor. The total score showed significant and expected associations with all outcomes in the adjusted model for all workers. Conclusions: The Japanese version of the measure of the psychological safety scale presented good reliability and validity. Psychological safety is important for employees' mental health and performance.

Keywords: occupational health; leadership; mental health; workplace climate; worksite

1. Introduction

Psychosocial factors at work are well-known determinants of workers' health and well-being. Psychological safety (PS) at work has received much attention as an important psychosocial factor in workers' positive mental health and other work-related outcomes, such as work engagement, satisfaction, communication, and performance [1,2]. PS describes workers' perceptions of the consequences of taking interpersonal risks in a particular context, such as a workplace [3,4]. In 1999, Edmondson defined PS as a shared belief that the team is safe for interpersonal risk-taking (i.e., doing learning behavior that may place workers at risk, including seeking feedback, sharing information, asking for help, talking about errors, and experimenting) [3].

Previous review articles have reported three streams of research on PS (i.e., individual-, team-, and organizational-level), with team-level analysis the largest and most active [1,4]. A meta-analysis has reported that individual- and team-level PS is significantly related to

work engagement, task performance, information sharing, creativity, learning behavior, and job satisfaction [2]. Recent studies have investigated the mediating role of PS in the association of leadership with job performance and mental health [5–8]. Papers published in the 2020s have focused more on the mediating effect of PS in the relationship between, for example, supervisor–subordinate communication and employees' commitment [9], employees' positive affect and motivations [10], and cognitive stress and turnover intentions [11]. Thus, accumulating evidence suggests that PS (especially individual- and team-level PS) is important for workers' health and well-being. In Japan, the concept of PS is becoming increasingly popular, along with growing interest in health and productivity management (H&PM), and it is expected that improving PS will enhance employees' mental health and performance. Nevertheless, epidemiological research on PS has not progressed sufficiently due to the lack of a multidimensional PS scale.

Many studies have used self-reported questionnaires adapted from Edmondson's team-level measure to quantitatively assess PS at work [1]. Although several scales with fewer than 10 items can measure PS in non-healthcare workers (non-HCWs) [3,12–14], including the Japanese version of the PS scale [12] developed by Liang et al. [15], multidimensional measurement of the individual and team levels of PS is unavailable. O'Donovan et al. (2020) presented a 19-item composite measure of PS (i.e., observation and survey component) containing three subsections (i.e., team leader, peers, and team) for use by healthcare teams, which they co-developed with healthcare professionals based on six measures and the PS literature [16]. The 19 items were identified as the corresponding comprehensive behaviors relevant to PS [16]. The three sections (i.e., team leader, peers, and team) were based on the real voices of professionals in the clinical settings, which revealed that the difficulty of taking actions related to PS was different for superiors or peers. The three sections that assess the individual and team levels of PS could provide detailed information about PS. A systematic review suggested that scales with a few items could not fully capture the state of PS at work; therefore, holistic, objective measuring instruments are needed [17]. A multidimensional and scalable measure could thus be used to investigate the association of these three components with employees' mental health and performance and to develop an effective intervention plan, among the variety of the workers, including HCW and non-HCW groups.

The associations of the individual and team levels of PS with mental health and work-related outcomes have not been investigated yet in HCW and non-HCW groups. A previous systematic review presented possible pathways from job resources (e.g., supportive leadership behavior) to positive and negative work outcomes (e.g., stress, conflict, and performance) through PS in the integrative theoretical framework of PS [1]. Some previous studies have suggested that PS reduced the risk of poor mental health outcomes, such as burnout, stress, and diminished well-being, by increasing social support for HCW and non-HCW [18,19]. However, the effect of PS on mental health has not been empirically examined. In addition, the effect may be different in HCWs and non-HCWs because the clinical settings offer different working conditions. Further study is needed to investigate the association of PS at work with mental health in both groups of workers using well-developed measures of PS.

The objectives of this study were: (i) to develop the Japanese version of the survey measure of PS introduced by O'Donovan et al. (2020) [16] and examine internal consistency, test–retest reliability, structural validity, and convergent validity of the scale in HCWs and non-HCWs; and (ii) to examine the associations of PS with psychological distress, work engagement, job performance, and job satisfaction.

2. Method

2.1. Scale Information and Participants

Although the measures developed by O'Donovan et al. (2020) were tailored to healthcare settings, the survey measure of PS could also be useful for measuring PS in non-HCWs. We obtained permission from O'Donovan, the developer of the original scale, to translate the measures into Japanese and validate them in HCWs and non-HCWs. The scale has

19 items divided into three sections (i.e., team leader, peers, and team), as introduced earlier. The Japanese version of the survey measure of PS was developed according to the procedure specified in the International Society of Pharmacoeconomics and Outcomes Research (ISPOR) task force guidelines [20]. The forward translation was conducted independently by two external translators proficient in Japanese and English. We then performed reconciliation, back-translation, back-translational review, harmonization, and cognitive debriefing. NS and YS conducted reconciliation, and KI chose the appropriate expression of the items. A native English translator back-translated the scale unaware of the original scale. The original developer confirmed and accepted the back-translated measures. Cognitive debriefing sessions were conducted with three Japanese nurses, including HA Their feedback about difficult wording was used for further modifications. The results from these stages were combined to develop the final measure. The full Japanese version of the survey measure of PS is presented in Supplementary Materials. The final scale contained 19 items, with nine items for the team leader, seven items for peers, and three items for the team as a whole, measured on a seven-point Likert scale. The scale score was calculated by averaging the items. Higher scores indicated greater PS.

Online surveys were administered twice to Japanese employees who had not been appointed as leaders of their team at baseline (January 2022) and at a two-week follow-up (February 2022). The Research Ethics Committee of the Graduate School of Medicine/Faculty of Medicine, The University of Tokyo, approved the study, No. 2019361NI-(3). The study was reported according to the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN) guideline, which is used to improve the quality of efforts to develop health-related self-report measurement instruments [21].

Participants living in Japan were invited from the registered panel of an Internet research company (Rakuten Insight Inc., Tokyo, Japan). Equal numbers of HCW and non-HCW were recruited. Participants' inclusion criteria were as below:

(i)   full-time employees 20–65 years old;
(ii)   working for a company with more than five employees;
(iii)   joined a team with more than three members;
(iv)   not a president or manager;
(v)   not a team leader.

All participants at baseline were invited to participate in a two-week follow-up. The follow-up survey was closed after 100 answers were collected.

2.2. Measurements

To test the convergent validity, the psychological safety scale for workers developed by Liang et al., social support at work, servant leadership, organization-based self-esteem, and organizational justice were measured.

Psychological safety was measured with the PS scale developed by Liang et al. (2012) that reflects Kahn's [22] focus on the workers' speaking out [15]. The Japanese version of the scale was translated by Ochiai et al. [12]. It contained five items measured on a five-point Likert scale. The items asked workers to rate the extent to which they feel free to express their thoughts and feelings. The scale score was calculated by averaging the items. Higher scores indicated greater PS. Cronbach's alpha was 0.71 in this sample.

Social support at work was measured using the Brief Job Stress Questionnaire (BJSQ) [23] containing items assessed on a four-point Likert scale. Social support at work comprises two subscales: supervisor support (three items) and co-workers' support (three items). A higher score indicated higher social support at work. In this sample, Cronbach's alphas were 0.89 for supervisor support and 0.88 for co-workers' support.

Servant leadership was measured with the Japanese short version of the Servant Leadership Survey (SLS-J) [24] evaluating the employees' supervisors. This scale includes six items measuring empowerment (leader side), three items measuring humility (servant side), three items measuring standing back (servant side), three items measuring stewardship (leader side), and three items measuring authenticity (servant side) on a six-point Likert

scale. The score for each dimension of the SLS-J-short was calculated by averaging the item scores. A higher score indicated stronger servant leadership. Cronbach's alpha was 0.95 for empowerment, 0.91 for humility, 0.84 for standing back, 0.83 for stewardship, and 0.81 for authenticity.

Organization-based self-esteem was measured using the Japanese version of the Organization-based Self-Esteem Scale [25]. This scale has eight items measured on a five-point Likert scale. The scale score was calculated by averaging the items. A higher score indicated higher organization-based self-esteem. Cronbach's alpha was 0.94.

Organizational justice was measured with the Japanese version of the Organizational Justice Questionnaire (OJQ) [26]. The OJQ consists of two subscales: procedural justice and interactional justice. Seven items assess procedural justice, and six items assess interactional justice on a five-point Likert scale. Each factor score was calculated by averaging the items. A higher score indicated a greater degree of organizational justice. Cronbach's alpha was 0.93 for procedural justice and 0.95 for interactional justice.

To examine the associations of the PS scale with mental health and job-related outcomes, psychological distress, work engagement, job performance, and job satisfaction were measured.

Psychological distress was measured with the Japanese version of the K6 scale [27,28]. This scale has six items (felt nervous, hopeless, restless or fidgety, worthless, depressed, and that everything was an effort in the past four weeks) rated on a five-point Likert scale. The total score was calculated by summing all items. The higher score indicated greater distress. Cronbach's alpha was 0.93.

Work engagement was measured using the Japanese version of the Utrecht Work Engagement Scale (UWES-9) [29]. This scale has nine items rated on a seven-point Likert scale. The scale score was calculated by averaging the items. The higher score indicated greater work engagement. Cronbach's alpha was 0.96.

Work performance was evaluated using one item of the Japanese version of the WHO Health and Work Performance Questionnaire (HPQ) [30]. Participants were asked to rate their work performance over the past four weeks. Items were scored on an 11-point scale ranging from 0 (worst) to 10 (best). A high score indicated good work performance.

Job satisfaction was measured by one item from the Brief Job Stress Questionnaire (BJSQ) [23] on a four-point Likert scale. A higher score indicated more job satisfaction.

Demographic variables were gender, age, education attainment, working from home, marital status, company size, occupation (e.g., professions, service workers), and job category (e.g., doctor, nurse) at baseline.

2.3. Statistical Analysis

In this study, the HCWs and non-HCWs were analyzed separately. First, the distribution of demographic characteristics as well as means and standard deviations (SDs) for the total scores of the PS scale and its three subscales at baseline and follow-up were calculated. Then, to assess internal consistency and test–retest reliability of the PS scale, Cronbach's α and intra-class correlation coefficient (ICC) for each of the subscales were calculated, following the COSMIN guidelines [21]. To assess structural validity, a confirmatory factor analysis (CFA) with three factors (i.e., team leader, peers, and team) was conducted to test the goodness of fit of the existing structure of PS. Model fit was assessed using a combination of fit indices including the chi-square (χ^2), the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), the goodness of fit index (GFI), the Akaike's information criterion (AIC), and the adjusted goodness of fit index (AGFI). If the CFA showed a poor fit, an exploratory factor analysis (EFA), which hypothesized no factor structure with the Promax rotation method, using a robust maximum likelihood estimation, was conducted. To test the hypotheses (expected relationships with other outcomes), convergent validity was examined using Pearson's correlation coefficients (r) which were calculated between each score of the PS scale and PS scale for workers developed by

Liang et al., social support at work, servant leadership, organization-based self-esteem, and organizational justice, which was considered to have moderate to high positive correlations with PS scale (r > 0.40) [12].

Since both independent and dependent variables were continuous, we conducted multiple linear regression (MLR) analyses to examine the relationship between the PS scale and outcomes (i.e., psychological distress, work engagement, job performance, and job satisfaction). After standardizing these variables, we first examined crude associations. Second, we examined adjusted associations considering the covariates for gender, age, educational attainment, working from home, marital status, company size, occupation, and job category simultaneously. Previous studies related to PS have frequently used MLR analysis [31,32], and this study followed traditional formulas [33,34] to estimate the relationship between theoretically and practically related variables. As literature suggested [1,2], PS can influence outcomes investigated in this study theoretically and conceptually. In addition to the full scale, we examined the relation of three subscales, putting each scale in the model individually (Model 1) and simultaneously (Model 2).

Statistical significance was defined as $p < 0.05$. IBM SPSS Statistics® version 28 (IBM, Armonk, NY, USA) and IBM SPSS Amos® version 28 were used for the analyses.

3. Results

The demographic characteristics of 400 participants (200 HCW and 200 non-HCW) are presented in Table 1. Among HCWs, 60% of participants were women, 58% were married, and 90% were employed in the medical industry. The mean age was 40.1 (SD = 9.6). HCWs included physicians (14%), nurses/midwives/public health nurses (48%), and others (39%). The number of team members was 20 or more (45%), 11–19 (23%), and 6–10 (21%). Among non-HCWs, 69% of the participants were men, 57% were married, and 25% were employed in the manufacturing industry. The mean age was 43.4 (SD = 10.7). The number of team members was 6–10 (44%), 3–5 (29%), and 11–19 (15%).

Internal consistency and test–retest reliability values of the PS scale are presented in Table 2. For HCWs, the Cronbach's alpha of each section ranged from 0.91 to 0.95, ICC ranged from 0.75 to 0.89, the mean total score was 4.96, and Cronbach's alpha was 0.96. For non-HCWs, Cronbach's alpha ranged from 0.93 to 0.96, ICC ranged from 0.84 to 0.92, the mean total score was 4.63, and Cronbach's alpha was 0.92.

The results of confirmatory factor analyses were χ^2 (149) = 540.001, CFI = 0.899, TLI = 0.884, RMSEA = 0.115, SRMR = 0.0444, GFI = 0.764, AIC = 622.001, and AGFI = 0.699 for HCWs. For non-HCWs, the values were χ^2 (149) = 584.778, CFI = 0.903, TLI = 0.888, RMSEA = 0.121, SRMR = 0.0472, GFI = 0.733, AIC = 666.778, and AGFI = 0.659. Factor loadings for each item of PS are presented in Table 3. The model fit was poor, so we tried conducting EFA, which hypothesized no factor structure with the Promax rotation method, using a robust maximum likelihood estimation. Table 4 shows the results of the EFA that yielded a two-factor structure. Among HCWs and non-HCWs, Section 2 (peers) and Section 3 (team as a whole) were combined into a single factor.

Table 5 shows correlations between the scores of the PS scales and the scores of the PS scale for workers developed by Liang et al., social support at work, servant leadership, organization-based self-esteem, and organizational justice. The PS score of the full scale and all the three subscales was significantly and positively correlated with the scores of all the scales. For non-HCWs, full scale had a high correlation with PS scale for workers developed by Liang et al. (r = 0.735), with supervisor support (r = 0.729), with empowerment (r = 0.757), and with interactional justice (r = 0.723). Section 1 (team leader) had a high correlation with PS scale for workers developed by Liang et al. (r = 0.711), supervisor support (r = 0.761), empowerment (r = 0.753), standing back (r = 0.709), and interactional justice (r = 0.748). Section 3 (team as a whole) showed high correlation with empowerment (r = 0.701). HCW did not achieve high correlations (r < 0.70) but showed a similar trend to non-HCW.

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Table 1. Characteristics of Japanese non-manager employees with more than three team members.

	Healthcare Workers (HCW)		Non-HCW	
	Baseline (n = 200)	Follow-Up (n = 100)	Baseline (n = 200)	Follow-Up (n = 100)
	n (%)/Mean (SD)	n (%)/Mean (SD)	n (%)/Mean (SD)	n (%)/Mean (SD)
Gender				
Men	80 (40.0)	41 (41.0)	138 (69.0)	67 (67.0)
Women	120 (60.0)	59 (59.0)	62 (31.0)	33 (33.0)
Age (year)	40.1 (9.6)	40.8 (9.5)	43.4 (10.7)	43.9 (10.3)
Marital status				
Single	66 (33.0)	27 (27.0)	70 (35.0)	37 (37.0)
Married	116 (58.0)	65 (65.0)	114 (57.0)	54 (54.0)
Divorced/widowed	18 (9.0)	8 (8.0)	16 (8.0)	9 (9.0)
Educational attainment				
High school or less	5 (2.5)	5 (5.0)	50 (25.0)	23 (23.0)
Junior college/vocational school	78 (39.0)	42 (42.0)	26 (13.0)	15 (15.0)
University or higher	117 (58.5)	53 (53.0)	124 (62.0)	62 (62.0)
Occupation				
Professional/technician	180 (90.0)	94 (94.0)	54 (27.0)	32 (32.0)
Clerical	8 (4.0)	4 (4.0)	74 (37.0)	37 (37.0)
Manual workers	4 (2.0)	1 (1.0)	25 (12.5)	10 (10.0)
Service workers	1 (0.5)	0 (0.0)	42 (21.0)	19 (19.0)
Others	7 (3.5)	1 (1.0)	5 (2.5)	2 (2.0)
Type of healthcare worker				
Physicians	28 (14.0)	12 (12.0)	n/a	n/a
Nurses	95 (47.5)	47 (47.0)	n/a	n/a
Others	77 (38.5)	41 (41.0)	n/a	n/a
Company size				
1000 or more	73 (36.5)	31 (31.0)	82 (41.0)	39 (39.0)
500–999	25 (12.5)	13 (13.0)	16 (8.0)	10 (10.0)
300–499	35 (17.5)	21 (21.0)	18 (9.0)	10 (10.0)
100–299	38 (19.0)	19 (19.0)	31 (15.5)	14 (14.0)
50–99	8 (4.0)	1 (1.0)	23 (11.5)	13 (13.0)
20–49	4 (2.0)	2 (2.0)	15 (7.5)	7 (7.0)
5–19	17 (8.5)	13 (13.0)	15 (7.5)	7 (7.0)
Number of team members				
20 or more	89 (44.5)	40 (40.0)	26 (13.0)	12 (12.0)
11–19	46 (23.0)	24 (24.0)	30 (15.0)	12 (12.0)
6–10	41 (20.5)	21 (21.0)	87 (43.5)	46 (46.0)
3–5	24 (12.0)	15 (15.0)	57 (28.5)	30 (30.0)
Status of team leader				
Manager	79 (39.5)	36 (36.0)	89 (44.5)	46 (46.0)
Not a manager	121 (60.5)	64 (64.0)	111 (55.5)	54 (54.0)
Working style				
Commuting	198 (99.0)	98 (98.0)	134 (67.0)	64 (64.0)
Working from home (WFH)	0 (0.0)	0 (0.0)	15 (7.5)	9 (9.0)
Hybrid	1 (0.5)	1 (1.0)	50 (25.0)	27 (27.0)
Other	1 (0.5)	1 (1.0)	1 (0.5)	0 (0.0)

SD: standard deviation.

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Table 2. The mean scores of the survey measures of psychological safety and internal and test–retest reliability.

	HCW				Non-HCW			
	Baseline (n= 200)		Follow-Up (n = 100)		Baseline (n = 200)		Follow-Up (n = 100)	
Subscales [Possible Range]	Mean (SD)	Cronbach's α	Mean (SD)	ICC	Mean (SD)	Cronbach's α	Mean (SD)	ICC
Section 1 (team leader) [1–7]	4.89 (1.32)	0.95	4.76 (1.24)	0.89	4.76 (1.39)	0.96	4.58 (1.50)	0.92
Section 2 (peers) [1–7]	5.04 (1.26)	0.94	4.90 (1.20)	0.83	4.71 (1.41)	0.96	4.73 (1.51)	0.84
Section 3 (team as a whole) [1–7]	4.98 (1.36)	0.91	4.80 (1.24)	0.75	4.59 (1.50)	0.93	4.58 (1.59)	0.90
Full scale [1–7]	4.96 (1.17)	0.96	4.82 (1.11)	0.88	4.71 (1.28)	0.97	4.63 (1.40)	0.92

HCW: healthcare workers. ICC: intra-class correlation coefficient.SD: standard deviation.

Table 3. Factor loading scores from the confirmatory factor analysis based on three-factor model.

	Factor Loading Scores	
	HCW (Baseline n = 200)	Non-HCW (Baseline n = 200)
Section 1 (team leader)		
1 If I had a question or was unsure of something in relation to my role at work, I could ask my team leader.	0.81	0.80
2 I can communicate my opinions about work issues with my team leader.	0.88	0.85
3 I can speak up about personal problems or disagreements to my team leader.	0.78	0.85
4 I can speak up with recommendations/ideas for new projects or changes in procedures to my team leader.	0.84	0.86
5 If I made a mistake on this team, I would feel safe speaking up to my team leader.	0.83	0.87
6 If I saw a colleague making a mistake, I would feel safe speaking up to my team leader	0.81	0.82
7 If I speak up/voice my opinion, I know that my input is valued by my team leader.	0.87	0.92
8 My team leader encourages and supports me to take on new tasks or to learn how to do things I have never done before.	0.86	0.85
9 If I had a problem in this company, I could depend on my team leader to be my advocate.	0.89	0.84
Section 2 (peers)		
1 If I had a question or was unsure of something in relation to my role at work, I could ask my peers.	0.82	0.79
2 I can communicate my opinions about work issues with my peers.	0.86	0.88
3 I can speak up about personal issues to my peers.	0.73	0.76
4 I can speak up with recommendations/ideas for new projects or changes in procedures to my peers.	0.89	0.90
5 If I made a mistake on this team, I would feel safe speaking up to my peers.	0.88	0.94
6 If I saw a colleague making a mistake, I would feel safe speaking up to this colleague.	0.85	0.90
7 If I speak up/voice my opinion, I know that my input is valued by my peers.	0.86	0.92
Section 3 (team as a whole)		
1 It is easy to ask other members of this team for help.	0.87	0.95
2 People keep each other informed about work-related issues in the team.	0.95	0.90
3 There are real attempts to share information throughout the team.	0.83	0.86

HCW: healthcare workers.

Table 4. Exploratory factor analysis without assuming the number of factors by using maximum likelihood method with Promax rotation.

	Factor Loading Score	
	Factor 1	Factor 2
HCW (baseline n = 200)		
(peers) 5 If I made a mistake on this team, I would feel safe speaking up to my peers.	**0.927**	−0.061
(peers) 2 I can communicate my opinions about work issues with my peers.	**0.921**	−0.096
(peers) 4 I can speak up with recommendations/ideas for new projects or changes in procedures to my peers.	**0.846**	0.043
(peers) 1 If I had a question or was unsure of something in relation to my role at work, I could ask my peers.	**0.813**	0.012
(peers) 3 I can speak up about personal issues to my peers.	**0.812**	−0.105
(peers) 6 If I saw a colleague making a mistake, I would feel safe speaking up to this colleague.	**0.794**	0.069
(peers) 7 If I speak up/voice my opinion, I know that my input is valued by my peers	**0.779**	0.106
(team as a whole) 2 People keep each other informed about work-related issues in the team.	**0.725**	0.167
(team as a whole) 1 It is easy to ask other members of this team for help.	**0.645**	0.180
(team as a whole) 3 There are real attempts to share information throughout the team.	**0.519**	0.295
(team leader) 9 If I had a problem in this company, I could depend on my team leader to be my advocate.	−0.064	**0.948**
(team leader) 7 If I speak up/voice my opinion, I know that my input is valued by my team leader.	−0.092	**0.946**
(team leader) 8 My team leader encourages and supports me to take on new tasks or to learn how to do things I have never done before.	0.030	**0.848**
(team leader) 6 If I saw a colleague making a mistake, I would feel safe speaking up to my team leader.	−0.029	**0.832**
(team leader) 4 I can speak up with recommendations/ideas for new projects or changes in procedures to my team leader.	0.065	**0.778**
(team leader) 1 If I had a question or was unsure of something in relation to my role at work, I could ask my team leader.	0.036	**0.778**
(team leader) 2 I can communicate my opinions about work issues with my team leader.	0.071	**0.747**
(team leader) 5 If I made a mistake on this team, I would feel safe speaking up to my team leader.	0.141	**0.728**
(team leader) 3 I can speak up about personal problems or disagreements to my team leader	0.093	**0.703**
Non-HCW (baseline n = 200)		
(peers) 6 If I saw a colleague making a mistake, I would feel safe speaking up to this colleague.	**0.975**	−0.109
(peers) 5 If I made a mistake on this team, I would feel safe speaking up to my peers.	**0.960**	−0.037
(peers) 4 I can speak up with recommendations/ideas for new projects or changes in procedures to my peers.	**0.886**	0.018
(peers) 7 If I speak up/voice my opinion, I know that my input is valued by my peers.	**0.880**	0.048
(peers) 3 I can speak up about personal issues to my peers.	**0.863**	−0.144
(peers) 2 I can communicate my opinions about work issues with my peers.	**0.844**	0.033
(peers) 1 If I had a question or was unsure of something in relation to my role at work, I could ask my peers.	**0.777**	0.013
(team as a whole) 1 It is easy to ask other members of this team for help.	**0.679**	0.271
(team as a whole) 2 People keep each other informed about work-related issues in the team.	**0.661**	0.239
(team as a whole) 3 There are real attempts to share information throughout the team.	**0.611**	0.221
(team leader) 3 I can speak up about personal problems or disagreements to my team leader.	−0.131	**0.952**
(team leader) 7 If I speak up/voice my opinion, I know that my input is valued by my team leader.	−0.008	**0.929**
(team leader) 2 I can communicate my opinions about work issues with my team leader.	−0.022	**0.881**

Table 4. *Cont.*

	Factor Loading Score	
	Factor 1	**Factor 2**
(team leader) 1 If I had a question or was unsure of something in relation to my role at work, I could ask my team leader.	−0.098	**0.875**
(team leader) 4 I can bring recommendations/ideas for new projects or changes in procedures to my team leader.	0.013	**0.856**
(team leader) 5 If I made a mistake on this team, I would feel safe speaking up to my team leader.	0.061	**0.829**
(team leader) 8 My team leader encourages and supports me to take on new tasks or to learn how to do things I have never done before.	0.128	**0.750**
(team leader) 6 If I saw a colleague making a mistake, I would feel safe speaking up to my team leader.	0.145	**0.708**
(team leader) 9 If I had a problem in this company, I could depend on my team leader to be my advocate.	0.184	**0.696**

Note: Bold-faced font emphasized the larger loading scores between Factor 1 and 2.

Table 5. Pearson's correlation coefficients between each subscale on the psychological safety scale and other psychometric scales (convergent validity).

Scales [Possible Range]	HCW (n = 200)				Non-HCW (n = 200)			
	Full Scale	Section 1 (Team Leader)	Section 2 (Peers)	Section 3 (Team as a Whole)	Full Scale	Section 1 (Team Leader)	Section 2 (Peers)	Section 3 (Team as a Whole)
Psychological Safety Scale for Workers [1–5]	0.657 *	0.628 *	0.536 *	0.603 *	0.735 *	0.711 *	0.589 *	0.700 *
Social support at work (BJSQ)								
Supervisor support [1–4]	0.640 *	0.696*	0.425 *	0.553 *	0.729 *	0.761 *	0.537 *	0.647 *
Coworkers support [1–4]	0.557 *	0.389 *	0.612 *	0.593 *	0.672 *	0.501*	0.694 *	0.715 *
Servant leadership survey								
Empowerment [1–6]	0.655 *	0.680 *	0.481 *	0.560 *	0.757 *	0.753 *	0.589 *	0.701 *
Humility [1–6]	0.494 *	0.547 *	0.315 *	0.428*	0.644 *	0.654 *	0.500*	0.567 *
Standing back [1–6]	0.564 *	0.609 *	0.384 *	0.486 *	0.694 *	0.709 *	0.538 *	0.597 *
Stewardship [1–6]	0.574 *	0.580 *	0.440 *	0.496 *	0.625 *	0.595 *	0.525 *	0.573*
Authenticity [1–6]	0.572 *	0.616 *	0.398 *	0.471 *	0.660 *	0.649 *	0.538 *	0.581 *
Organization-based self-esteem [1–5]	0.421 *	0.387 *	0.403 *	0.306 *	0.529 *	0.477 *	0.466 *	0.512 *
Organizational justice								
Procedural justice [1–5]	0.570 *	0.586 *	0.419 *	0.505 *	0.594 *	0.586 *	0.471 *	0.548 *
Interactional justice [1–5]	0.596 *	0.654 *	0.397 *	0.501 *	0.723 *	0.748 *	0.547 *	0.629 *

HCW: healthcare workers; BJSQ: Brief Job Stress Questionnaire; * $p < 0.01$.

The results of the MLR analyses are shown in Table 6. In HCWs, the full scale showed significant associations with low psychological distress (adjusted β = −0.508, $p < 0.001$), high work engagement (adjusted β = 0.462, $p < 0.001$), high job performance (adjusted β = 0.476, $p < 0.001$), and high job satisfaction (adjusted β = 0.592, $p < 0.001$). In Model 1 (individually entered), all three subscales of the scale (team leader, peer, and team as a whole) were significantly associated with low psychological distress, high work engagement, high job performance, and high job satisfaction. In Model 2 (simultaneously entered), Section 1 (team leader) was significantly associated with high work engagement, high job performance, and high job satisfaction in the adjusted model. Section 2 (peers) was significantly associated with low psychological distress. Section 3 (team as a whole) was significantly associated with high job satisfaction.

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Table 6. Associations of psychological safety scale with psychological distress, work engagement, job performance, and job satisfaction.

Variables	Psychological Distress (K6)				Work Engagement (UWES-9)				Job Performance (HPQ)				Job Satisfaction (BJSQ)			
	Crude		Adjusted [c]		Crude		Adjusted [c]		Crude		Adjusted [c]		Crude		Adjusted [c]	
	β	p	β	p	β	p	β	p	β	p	β	p	β	p	β	p
HCWs																
Full scale	−0.507	<0.001 *	−0.508	<0.001	0.465	<0.001 *	0.462	<0.001	0.476	<0.001 *	0.476	<0.001 *	0.597	<0.001 *	0.592	<0.001 *
Model 1 [a]																
Section 1 (team leader)	−0.422	<0.001 *	−0.431	<0.001 *	0.428	<0.001 *	0.422	<0.001 *	0.479	<0.001 *	0.477	<0.001 *	0.542	<0.001 *	0.543	<0.001 *
Section 2 (peers)	−0.508	<0.001 *	−0.497	<0.001 *	0.409	<0.001 *	0.413	<0.001 *	0.390	<0.001 *	0.390	<0.001 *	0.500	<0.001 *	0.495	<0.001 *
Section 3 (team as a whole)	−0.448	<0.001 *	−0.445	<0.001 *	0.411	<0.001 *	0.409	<0.001 *	0.366	<0.001 *	0.381	<0.001 *	0.605	<0.001 *	0.590	<0.001 *
Model 2 [b]																
Section 1 (team leader)	−0.128	0.141	−0.138	0.131	0.243	0.008 *	0.210	0.026 *	0.396	<0.001 *	0.365	<0.001 *	0.251	0.002 *	0.245	0.003 *
Section 2 (peers)	−0.363	0.001 *	−0.332	0.002 *	0.140	0.193	0.162	0.140	0.131	0.219	0.106	0.309	−0.030	0.754	−0.013	0.889
Section 3 (team as a whole)	−0.075	0.473	−0.093	0.384	0.135	0.215	0.143	0.195	−0.006	0.955	0.056	0.590	0.459	<0.001 *	0.439	<0.001
Non-HCWs																
Full scale	−0.458	<0.001 *	−0.424	<0.001 *	0.524	<0.001 *	0.510	<0.001 *	0.516	<0.001 *	0.494	<0.001 *	0.598	<0.001 *	0.587	<0.001 *
Model 1 [a]																
Section 1 (team leader)	−0.405	<0.001 *	−0.372	<0.001 *	0.504	<0.001 *	0.496	<0.001 *	0.498	<0.001 *	0.484	<0.001 *	0.580	<0.001 *	0.574	<0.001 *
Section 2 (peers)	−0.422	<0.001 *	−0.391	<0.001 *	0.413	<0.001 *	0.395	<0.001 *	0.425	<0.001 *	0.397	<0.001 *	0.479	<0.001 *	0.467	<0.001 *
Section 3 (team as a whole)	−0.422	<0.001 *	−0.396	<0.001 *	0.522	<0.001 *	0.509	<0.001 *	0.474	<0.001 *	0.454	<0.001 *	0.567	<0.001 *	0.552	<0.001 *
Model 2 [b]																
Section 1 (team leader)	−0.185	0.049 *	−0.152	0.103	0.280	0.002 *	0.278	0.002 *	0.318	<0.001 *	0.318	<0.001 *	0.361	<0.001 *	0.362	<0.001 *
Section 2 (peers)	−0.195	0.086	−0.172	0.133	−0.104	0.327	−0.137	0.209	0.045	0.677	0.006	0.959	−0.032	0.750	−0.035	0.731
Section 3 (team as a whole)	−0.127	0.304	−0.146	0.241	0.405	<0.001 *	0.423	<0.001 *	0.207	0.082	0.222	0.064	0.332	0.003 *	0.322	0.004 *

[a] Three subscales of psychological safety scale (team leader, peer, and team as a whole) were individually entered. [b] Three subscales of psychological safety scale (team leader, peer, and team as a whole) were simultaneously entered. [c] The adjusted model additionally adjusted for sex, age, industry, type of healthcare worker, working style (e.g., work from home), educational attainment, company size, and occupation among HCWs, and adjusted for the same variables excluding type of healthcare workers among non-HCWs. K6: Kessler 6; UWES: Utrecht Work Engagement Scale; HCW: healthcare worker; HPQ: Health and Work Performance Questionnaire; BJSQ: Brief Job Stress Questionnaire; * p < 0.05.

For non-HCWs, the full scale showed significant associations with low psychological distress (adjusted β = −0.424, *p* < 0.001), high work engagement (adjusted β = 0.510, *p* < 0.001), high job performance (adjusted β = 0.494, *p* < 0.001), and high job satisfaction (adjusted β = 0.587, *p* < 0.001). In Model 1 (individually entered), all three subscales showed significant associations similar to those observed in HCWs. In Model 2 (simultaneously entered), Section 1 was significantly associated with high work engagement, high job performance, and high job satisfaction in the adjusted model. Section 3 (team as a whole) was associated with high work engagement and job satisfaction. No section showed a significant association with low psychological distress in the adjusted model, but Section 1 in the crude model did show significance.

4. Discussion

The Japanese version of the survey measure of PS developed by O'Donovan et al. demonstrated acceptable high internal consistency, test–retest reliability, and convergent validity. Structural validity remained an issue. The full survey measure of PS showed significant associations with low psychological distress, high work engagement, high job performance, and high job satisfaction. These results were found for both HCWs and non-HCWs. Overall, the Japanese version of the survey measure of PS proved to be reliable and valid for use in all working populations.

In terms of internal consistency, Cronbach's alpha of the full scale exceeded the stringent criterion of 0.80 [35]. The ICC for test–retest (two weeks) reliability was acceptable, except for HCWs in Section 3 (team as a whole). Because Section 3 had a small number of items, discrepancies in the evaluation of one item may easily be reflected in a lower ICC.

In CFA, the three-factor model did not have a good fit theoretically. The indicators of the fit model in CFA showed a low to moderately acceptable fit of the three-factor model. Rather, EFA suggested a two-factor structure. Peers and team as a whole were combined into one factor, suggesting that the Japanese population might imagine colleagues (peers) when they see the word "team". A future study is needed to examine the structure in another sample.

The factor loading pattern was almost identical for factor 1 (peers and team) among both HCWs and non-HCWs. However, the pattern differed slightly for factor 2 (leader), while "speaking up is valued by team leader" (no. 7) loaded highly on both. For HCWs, a "sense of trust in team leader" (no. 9) and "support for the new task and learning (no.8) had high loadings, while for non-HCWs, "feeling safe discussing personal problems and disagreements" (no. 3) and "communicating about work issues" (no. 2) had high loadings. In clinical settings, patient safety and speaking are likely to be prioritized regardless of leaders' attitudes. While leaders' behavioral integrity affected the reported treatment errors [36], trust in leaders may influence the PS atmosphere among Japanese HCWs. Support for learning new tasks may characterize leaders who create psychologically safe workplaces in Japanese clinical settings. In non-HCWs, a previous study suggested that being allowed to express opinions and doing so were different experiences among Japanese workers [12]. Leaders' willingness to allow and encourage employees to speak up and employees' perceptions of doing so may both be required to ensure PS among non-HCWs.

Convergent validities were also well supported, as we expected. The findings were in line with previous research showing the positive association of PS with supervisor support, co-workers' support, and organizational factors [12]. A supportive work environment may make workers feel safe in taking interpersonal risks. PS has been known to mediate the relationship between servant or inclusive leadership and job-related outcomes (e.g., job performance) [5–8]. Concerning servant leadership, subscales of empowerment showed the greatest associations for both HCWs and non-HCWs. Empowerment in leadership was defined as a motivational concept aimed at fostering a pro-active, self-confident attitude among followers and giving them a sense of personal power by encouraging self-directed decision making, information sharing, and coaching for innovative performance [24]. In Japan, leaders who can empower their team members also facilitate PS. For non-HCWs,

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PS was highly correlated (r > 0.70) with supervisor factors, such as supervisor support, leadership (especially empowerment), and interactional justice. For HCWs, no measure achieved high correlations. The leader's supportive attitude, examined in previous research, may correspond with PS for non-HCW, and other workplace factors may influence clinical settings. Another reason may be that measurement scales tested for convergent validity were developed for workers (not specifically for HCWs). Overall, theoretical associations suggested good convergent validity for both HCWs and non-HCWs.

The full scale of the survey measure of PS was significantly associated with low psychological distress, high work engagement, high job performance, and high job satisfaction, as we expected. This finding empirically demonstrated the theoretical framework stated in the previous literature [1]. Model 2 (simultaneous entry) showed significant associations between Section 1 (team leader) and work engagement, job performance, and job satisfaction for both HCWs and non-HCWs. Given the Japanese corporate culture that emphasizes hierarchical relationships [37], the team leader may be listening to and respecting others to enhance these job-related positive outcomes. At the same time, low psychological distress was significantly associated with Section 2 (peers) only for HCWs. As mentioned earlier, speaking up is especially important in clinical settings to prioritize patient safety [36]; therefore, for HCWs, an environment where they cannot admit their mistakes or point out those of their peers may cause frustration and psychological distress. A previous study reported that the ability of nurses to forgive themselves and others was significantly associated with PS [38]. Lack of PS from peers may increase the risk of mental health deterioration among HCWs. Peers' role may be more essential for mental health in clinical settings than in other workplaces. PS was associated with high work engagement and job performance in this study. A safe atmosphere where workers can ask questions, communicate opinions, raise issues, and suggest new ideas may increase their motivation.

This study had several limitations. It was conducted online, and participants were recruited from the research company panel, decreasing the generalizability. In addition, the self-reporting style could have biased the results; for example, people with high distress may have rated the items differently. Finally, the cross-sectional nature of the analysis precluded the assessment of causal relationships. Future studies could explore the associations of PS with outcomes using longitudinal design and workers from more diverse backgrounds.

5. Conclusions

The Japanese version of the survey measure of PS developed by O'Donovan et al. had acceptable reliability and validity for both HCWs and non-HCWs groups, while structural validity remained an issue and needs further examination. This measure is the first Japanese scale that can evaluate the multidimensional PS of leaders, peers, and teams in the workplace. The associations with other important factors [2] (e.g., creativity, learning behavior) and the mediator role of PS, which recent studies examined [5–11], were not investigated in this study. Such evidence should be replicated in the future, using this scale in Japan. Despite the limitation of the cross-sectional analysis, PS showed positive associations with good mental health and positive job-related outcomes in this study. Considering the present findings that there was a slight difference in impacts of PS in HCWs and non-HCWs on employees' mental health, future research may be able to develop effective interventions to improve PS by industry. Examining multiple aspects of PS may also improve the workplace environment by considering specific issues in each workplace context.

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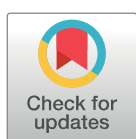
PLOS ONE

Victimization and witnessing of workplace bullying and physician-diagnosed physical and mental health and organizational outcomes: A cross-sectional study

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Abstract

Background

Compared to the numerous reports on mental health outcomes of workplace bullying victims, research on organizational outcomes of witnesses and physical health outcomes of victims and witnesses is scarce. Therefore, the purpose of this study was to investigate the relationship between bullying victimization and witnessing and various physical and mental health outcomes and organizational outcomes such as sickness absence, work performance, and job satisfaction.

Methods

This study used cross-sectional data from a nationally representative, community-based sample of 5,000 Japanese residents aged 20–60. We analyzed data from 1,496 respondents after excluding those not working at the time of the survey and those with missing values. Workplace bullying, psychological distress, physical complaints, and job satisfaction were assessed with the New Brief Job Stress Questionnaire and work performance with the World Health Organization's Health and Work Performance Questionnaire. In addition, subjective health status, physician-diagnosed mental or physical illness, and sickness absence were asked as one item. Hierarchical multiple regression analysis or Poisson regression analysis was conducted to assess the association between victimization/witnessing workplace bullying and health and organizational outcomes.

Results

Both victimization and witnessing workplace bullying were significantly associated with psychological distress, physical complaints, subjective poor health, physician-diagnosed

mental disorders, and job dissatisfaction. Victimization of workplace bullying was further associated with physician-diagnosed respiratory diseases, sickness absence ($\geq$7 days), and poor work performance. Victims were absent from work for 4.5 more sick days and had 11.2% lower work performance than non-victims.

Conclusions

The results showed that both victimization and witnessing workplace bullying were significantly associated with physical and mental outcomes and various organizational outcomes. Organizations should implement further measures to prevent personal and organizational losses due to workplace bullying.

Introduction

Workplace bullying is one of the most severe psychosocial stressors at work. Several meta-analyses and systematic reviews have already been conducted to confirm the association between exposure to workplace bullying and various mental health outcomes, such as depression or anxiety [1, 2], post-traumatic stress disorder (PTSD) [3], sleep [4], and suicidal ideation [5]. These studies clearly show that workplace bullying has unquestionably harmed the mental health of the victims.

Compared to the numerous reports on mental health outcomes of workplace bullying, few studies have focused on physical health outcomes [6]. Disease-level physical health outcomes of workplace bullying have been reported, including cardiovascular disease [7, 8], type 2 diabetes [9], and fibromyalgia [10]. By contrast, an association between workplace bullying and other chronic diseases, such as respiratory and gastrointestinal diseases, has not been thoroughly investigated to the best of our knowledge. For instance, Kivimaki, Elovainio [11] reported that a higher proportion of victims had chronic diseases among Finnish hospital employees (n = 5,655]. However, they did not report which chronic diseases they had more than non-victims. To date, only one cross-sectional study has reported that bullying was a predictor of asthma, a respiratory disease, in the Peruvian sample of cleaners (n = 199) [12]. Although a recent study reported that workplace bullying was associated with increased doctor visits, the diagnosis is unknown [13]. On the other hand, several qualitative studies have reported that victims of workplace bullying had symptoms of asthma or gastric ulcers [14, 15]. Therefore, more quantitative study is needed to investigate the association between workplace bullying and various physical diseases, including respiratory diseases or digestive diseases.

The primary organizational outcomes of workplace bullying are absenteeism, turnover, and work performance. Meta-analytic studies have found significant associations between workplace bullying and sickness absence and poor work performance [16, 17]. However, most of the studies that have examined the work performance of bullying victims have only calculated the correlation coefficient between bullying and work performance without using standardized measures [17, 18]. For example, although Kivimaki, Elovainio [11] reported that victims had a 26% higher risk of taking sickness absence, they did not report how many more days the victims took off for sickness absence than non-victims. To calculate workplace bullying costs [19, 20], clarifying the difference between victims and non-victims is essential. Thus, this study investigates the relationship between bullying and other organizational outcomes, such as job satisfaction, and examines how many more days victims take off as sickness absence and how many percent less they work than non-victims.

Few studies have examined witnesses' health and organizational outcomes after adjusting for exposure to bullying. Most studies have included some victims among the witnesses, contributing to overestimating the health effects of witnessing workplace bullying [21]. Therefore, when investigating witness health outcomes, researchers have to exclude bullied people from witnesses or control for the experience of being bullied to see a "pure" effect of witnessing bullying. Although a multilevel study has reported that department-level bullying can affect subsequent psychological distress and intention to leave, even when controlling for individual exposure to bullying [22], no studies have examined the association between witnessing bullying and organizational outcomes such as sickness absence and work performance, to the best of our knowledge.

To sum up, previous research has focused primarily on mental health outcomes of bullying victimization. Furthermore, most bullying studies used specific workers, such as health care workers, and cannot be generalized to the general working population. To overcome this gap, we conducted a cross-sectional study for a nationally representative sample in Japan. We then investigated the association between bullying victimization and witnessing and various physical and mental health outcomes, such as physician-diagnosed physical and mental disorders, subjective health, and physical complaints, as well as organizational outcomes such as sickness absence, work performance, and job satisfaction.

Methods

Participants

This cross-sectional study was conducted in 2010 for a nationally representative community-based sample of 5,000 Japanese residents between the ages of 20 and 60. The details of the random sampling were described elsewhere [23]. A total of 2,384 agreed to participate and completed the questionnaire (response rate: 47.7%). After excluding 751 respondents who were not working at the time of the survey and 137 respondents who had missing responses on sex, age, education, occupation, employment, workplace bullying, subjective health status, sickness absence, job satisfaction, the data from 1,496 respondents were analyzed in this study.

Ethics statement. The Ethical Committee of the Graduate School of Medicine/Faculty of Medicine, The University of Tokyo, reviewed and approved this study's aims and procedures before conducting the survey (#2953). The questionnaire was directly sent to each participant's home via the survey company. We informed the participants that their participation in this study was voluntary, and they agreed to participate in the research by filling out an anonymous questionnaire. Thus, implied informed consent was obtained in this study.

Measures

Workplace bullying. Workplace bullying was assessed using a self-labeling method without a definition, using the New Brief Job Stress Questionnaire (New BJSQ) [24, 25]. First, respondents were asked whether they experienced bullying at the survey time. The respondents who answered "1 = very much so" or "2 = moderately so" were defined as "victims" [23]. Respondents were also asked whether there are people who are bullied or harassed in their workplace, and those who answered "1 = very much so" or "2 = moderately so" were defined as "witnesses." Three categories were created from these two questions: "not bullied nor witnessed," "not bullied but witnessed," and "bullied" since both experiencing and witnessing bullying have been reported as risk factors for adverse health outcomes [22].

Mental health. Five aspects measured psychological distress: vigor (three items), anger-irritability (three items), fatigue (three items), anxiety (three items), depression (six items) using an 18-item scale of the New BJSQ [24]. Each item sample is "I have been full of energy

(reverse item)" (vigor), "I have felt angry" (anger-irritability), "I have felt extremely tired" (fatigue), "I have felt worried or insecure" (anxiety), and "I have felt sad" (depression). A four-point Likert-style response option was used: "almost never = 1" to "almost always = 4." Average scores of 18 items were calculated for analysis. Higher scores mean having greater psychological distress.

Physician-diagnosed mental disorders were measured by asking whether the individual has received treatment for a mental disorder, including depression. Those who answered "yes" were determined to have a mental disorder. In Japan, "treatment" refers to a medical treatment based on a physician's diagnosis and is performed only by the physician. The Medical Practitioners Law strictly prohibits other medical personnel from performing medical treatment, including medication prescription. Therefore, in this study, "physician-diagnosed mental disorders" refer to mental disorders that a physician is currently treating.

Physical health.   For physician-diagnosed physical diseases, respondents were asked, "Are you currently receiving treatment for any of the following diseases or symptoms?" and answered "yes" or "no" to chronic diseases such as cardiovascular diseases (i.e., hypertension, heart disease, stroke), diabetes, respiratory diseases (i.e., asthma, chronic bronchitis), digestive diseases (i.e., stomach ulcer, liver disease), and orthopedic diseases (i.e., back pain). In this survey, physician-diagnosed physical diseases refer to diseases currently being treated by a physician. In the analyses, "no" was set as a reference group.

Physical complaints were measured by an 11-item of the New BJSQ [24]. The item samples are "I have experienced headaches" and "I have felt dizzy." Response options were the same as for the psychological distress scale of the BJSQ. The higher the score, the greater the physical complaints.

Subjective health status was measured with a single item, "Overall, how was your health during the past month?" Response options ranged from "not good at all = 1" to "perfect = 6" and those who answered "perfect," "very good," or "good" classified as "good," and those who answered "not so good," "not good," or "not good at all" classified as "poor." In the analyses, "good" was set as a reference group.

Sickness absence.   To measure sickness absence, we asked, "In the past year, how many days in total did you take off from work due to health problems?" Two categories were created from this question: sickness absence ($\geq$1 day) and sickness absence ($\geq$7 days). In the analysis, no sick leave and less than 7 days of sick leave were established as the reference groups, respectively.

Work performance.   A single item measured work performance (relative presenteeism) from the World Health Organization's Health and Work Performance Questionnaire (WHO-HPQ) [25, 26]. The respondents were asked, "On a scale from 0 to 10 where 0 is the worst work performance anyone could have at your job and 10 is the performance of a top worker, how would you rate your overall work performance on the days you worked during the past four weeks (28 days)?" Again, response options were 0 to 10, and a higher score means having more excellent work performance.

Job satisfaction

Job satisfaction was measured by one item of the New BJSQ [24]. Response options ranged from "dissatisfied = 1" to "satisfied = 4," with those who answered "satisfied" or "somewhat satisfied" classified as "satisfied" and those who answered "somewhat dissatisfied" or "dissatisfied" classified as "dissatisfied." In the analyses, "satisfied" was set as a reference group.

Other covariates.   As individual and socioeconomic status (SES) characteristics, sex, age, education, household income during the past year, occupation, and employment were asked to the respondents. Then, dummy variables were created for analyses: sex (male = 1,

female = 0), age (under 29 = 1, over 30 = 0), education (high school graduates or below = 1, college graduates or above = 0), household income (less than 2.5 million yen [equivalent to < US$22,000, if 1$ = \115] = 1, over 250 million yen = 0), occupation (manager = 1, others = 0), and employment (permanent = 1, others = 0).

Statistical analysis

First, Spearman's correlation coefficients were calculated between all variables. Second, mean values of continuous variables including psychological distress, physical complaints, sickness absence, and work performance were compared among victims, witnesses, and non-victims/non-witnesses by analysis of variance (ANOVA). Then, hierarchical multiple regression analyses were conducted to examine the relationship between experienced or witnessed bullying at work and psychological distress, physical complaints, and work performance. Finally, we conducted Poisson regression analyses to examine the relationship between workplace bullying and categorical health outcomes, including physician-diagnosed diseases and subjective health and organizational outcomes, including sickness absence (≥ 1 or ≥ 7) and job satisfaction. Prevalence ratios (PRs) and 95% Confidence Intervals (CIs) were calculated, adjusting for individual characteristics (sex and age) and SES variables (education, household income, occupation, and employment status). The 2-tailed p-value for statistical significance to see the differences among each social indicator was set at 0.05. All analyses were conducted using SPSS 27.0 for Windows.

Results

Characteristics of the respondents

Table 1 shows the characteristics of the respondents of this study. Most of the respondents were males, 40–49 years old, graduated high school or below, had a household income between \2.50 million and \4.99 million, had professional or technical jobs, and were permanent (full-time) employees. Six percent of the respondent had experienced workplace bullying, and ten percent had not been bullied but witnessed bullying at the workplace. Approximately 60% of the respondents rated their health as "good," had at least one day of sickness absence during the past year, and rated their job satisfaction as "satisfied."

Correlations between variables

Table 2 shows Spearman's correlation coefficients between all variables in this study. Experiencing workplace bullying was significantly and positively associated with younger age, low household income, psychological distress, physician-diagnosed mental disorders, physician-diagnosed respiratory diseases, physical complaints, subjective poor health, sickness absence, and job dissatisfaction, while significantly and negatively associated with work performance. Witnessing bullying at the workplace was also significantly and positively associated with psychological distress, physician-diagnosed mental disorders, physical complaints, subjective poor health, sickness absence, and job dissatisfaction.

Comparison of the mean scores of psychological distress, physical complaints, sickness absence, and work performance

Table 3 shows the comparison of the mean values of continuous outcome variables among victims (n = 91), witnesses (n = 151), and non-bullied/non-witnessed respondents (n = 1,254) by ANOVA. The highest scores in victims and second-highest scores in witnesses were observed in psychological distress and physical complaints. Victims reported significantly lower work performance than non-bullied/non-witnessed respondents; the difference of the scores was

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Table 1. Characteristics of respondents in this study (N = 1,496).

Individual and socioeconomic characteristics	n	%	Health outcomes	n	%
Sex			Physician-diagnosed mental disorders		
Male	781	52.2	Yes	32	2.1
Female	715	47.8	No	1464	97.9
Age			Physician-diagnosed cardiovascular diseases		
< 30	234	15.6	Yes	143	9.6
30–39	422	28.2	No	1353	90.4
40–49	428	28.6	Physician-diagnosed diabetes		
> = 50	412	27.5	Yes	63	4.2
Education			No	1433	95.8
High school graduate or below	679	45.4	Physician-diagnosed respiratory diseases		
Vocational school/college graduate	401	26.8	Yes	36	2.4
University/graduate school graduate	416	27.8	No	1460	97.6
Household income (million yen)			Physician-diagnosed digestive diseases		
< 2.50	125	8.4	Yes	98	6.6
2.50–4.99	453	30.3	No	1398	93.4
5.00–7.49	395	26.4	Physician-diagnosed orthopedic diseases		
7.50–9.99	240	16.0	Yes	191	12.8
≥10.00	152	10.2	No	1305	87.2
Unknown	131	8.8	Physician-diagnosed other chronic diseases		
Occupation			Yes	201	13.4
Managers	144	9.6	No	1295	86.6
Professionals or technicians	338	22.6	Subjective health status		
Clerks	281	18.8	Good	929	62.1
Sales workers	160	10.7	Poor	567	37.9
Service workers	151	10.1			
Production workers and laborers	225	15.0	**Organizational outcomes**		
Others	197	13.2	Sickness absence (≥1)		
Employment contract			Yes	895	59.8
Permanent	969	64.8	No	601	40.2
Temporary/contract/part-time	477	31.9	Sickness absence (≥7)		
Others	50	3.3	Yes	417	27.9
Workplace bullying			No	1079	72.1
Not bullied nor witnessed	1254	83.8	Job satisfaction		
Not bullied but witnessed	151	10.1	Satisfied	918	61.4
Bullied	91	6.1	Dissatisfied	578	38.6

0.75, which means an 11.2% difference between victims and non-victims (0.75/6.72*100). Witnesses also reported significantly lower work performance than non-bullied/witnessed respondents. In contrast, the mean days of sickness absence were not significantly different among victims, witnessed, and non-bullied/non-witnessed respondents, although the difference was 4.5 days between victims and non-victims.

Relationship between workplace bullying and psychological distress, physical complaints, and work performance

Table 4 shows the results of hierarchical regression analyses of bullying and continuous outcome variables. In Step 2 where sex, age, education, household income, occupation, and

Table 2. Spearman's correlations between variables.

Variables †	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1 Age (under 29 = 1)	1																			
2 Sex (male = 1)	-.07**	1																		
3 Education (high school = 1)	-.10**	-.03	1																	
4 Household income (< 250 = 1)	.04	-.09**	.06*	1																
5 Occupation (manager = 1)	-.13**	.25**	-.04	-.07**	1															
6 Employment (permanent = 1)	.07**	.46**	-.13**	-.18**	.12**	1														
7 Psychological distress	.08**	.08**	-.03	.05*	-.04	.13**	1													
8 Mental disorders (yes = 1)	-.03	.04	.02	.06*	.03	.04	.08**	1												
9 Cardiovascular diseases (yes = 1)	-.13**	.08**	.07*	.03	.14**	-.00	-.02	-.00	1											
10 Diabetes (yes = 1)	-.06*	.11**	.00	-.02	.08**	.02	-.01	.04	.22**	1										
11 Respiratory diseases (yes = 1)	-.01	.00	-.01	.00	-.01	-.02	.05	.01	.04	-.01	1									
12 Digestive diseases (yes = 1)	-.07**	.02	.03	-.01	.02	-.03	.02	.05*	.10**	.08**	.08**	1								
13 Orthopedic diseases (yes = 1)	-.04	-.02	.06*	.00	.01	-.00	.08**	-.04	.05	.06*	.02	.03	1							
14 Other chronic diseases (yes = 1)	-.03	-.07*	-.02	.00	-.04	-.05*	.06*	.01	-.04	-.02	.00	-.03	.03	1						
15 Physical complaints	.03	-.08**	.03	.06*	-.03	.02	.61**	.07**	.01	.05*	.08**	.15**	.17**	.12**	1					
16 Poor subjective health (poor = 1)	.04	-.03	.03	.06*	-.03	.02	.44**	.14**	.08**	.10**	.08**	.14**	.16**	.15**	.46**	1				
17 Sickness absence	.03	-.02	.02	.02	-.04	.02	.10**	.08**	.05*	.04	.04	.07**	.12**	.09**	.13**	.13**	1			
18 Work performance	-.18**	.02	.07**	-.02	.01	-.08**	-.21**	-.04	.03	.02	-.02	.03	.03	-.04	-.08**	-.10**	-.07**	1		
19 Job dissatisfaction (dissatisfied = 1)	.10**	.05*	.01	.01	-.05*	.09**	.49**	.03	-.02	-.01	.06*	.03	.06*	.07**	.28**	.26**	.08**	-.20**	1	
20 Bullied at work (yes = 1)	.06*	.00	-.03	.10**	-.03	-.01	.21**	.08**	-.02	.02	.07**	.00	.03	.04	.16**	.16**	.07**	-.08**	.17**	1
21 Witnessed bullying at work (yes = 1)	-.03	.01	-.03	.01	-.05	-.00	.18**	.06*	-.01	-.04	.02	.03	-.00	.04	.10**	.10**	.05	-.01	.12**	-.09**

SD: Standard deviation.

* $p < .05$

** $p < .01$.

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Table 3. Mean values of psychological distress, physical complaints, sickness absence, and work performance of bullied respondents (n = 91) and witnesses (n = 151) compared with non-bullied/witnessed respondents (n = 1,254): ANOVA.

Variables:	Mean		SD	p value
Psychological distress				< 0.001
Not bullied nor witnessed	2.07	*ab	0.57	
Not bullied but witnessed	2.47	*ac	0.56	
Bullied	2.73	*bc	0.68	
Physical complaints				< 0.001
Not bullied nor witnessed	1.73	*ab	0.51	
Not bullied but witnessed	1.91	*ac	0.52	
Bullied	2.16	*bc	0.64	
Sickness absence (days)				0.230
Not bullied nor witnessed	8.42		23.87	
Not bullied but witnessed	8.84		21.63	
Bullied	12.93		31.98	
Work performance				< 0.001
Not bullied nor witnessed	6.72	*a	1.70	
Not bullied but witnessed	6.61	*b	1.77	
Bullied	5.97	*ab	2.23	

* $p < .05$. by Bonferroni.

https://doi.org/10.1371/journal.pone.0265863.t003

employment were entered, both experiencing and witnessing workplace bullying were significantly and positively associated with psychological distress (b = 0.64; 0.40, $p < 0.001$), physical complaints (b = 0.43; 0.19, $p < 0.001$); significantly and negatively associated with work performance (b = -0.68; -0.14, $p < 0.001$). However, the regression coefficients were larger in the association between bullying victimization and outcomes than witness and outcomes.

Relationship between workplace bullying and physician-diagnosed psychical and mental disorders under treatment, subjective health, sickness absence, and job satisfaction

Table 5 shows the results of Poisson regressions of bullying and categorical health and organizational outcome variables. Both an exposure to workplace bullying and witnessing bullying at the workplace were significantly associated with subjective poor health (PR: 2.00 [95%CI: 1.53 to 2.61]; 1.52 [1.19 to 1.94]), physician-diagnosed mental disorders (PR: 3.93 [1.55 to 10.00]); 2.91 [1.22 to 6.92])], and job dissatisfaction (PR: 1.99 [1.53 to 2.60]; 1.61 [1.27 to 2.04]), after adjusting for individual characteristics and SES variables. In addition, exposure to workplace bullying was significantly associated with sickness absence (≥ 7) (PR: 1.56 [1.10 to 2.19])]) and physician-diagnosed respiratory diseases (PR: 3.33 [1.35 to 8.23]) in the adjusted model.

Discussion

The current study aimed to investigate the association between experiencing and witnessing bullying at work and various health and organizational outcomes in a nationally representative sample in Japan. The study results revealed victimization of workplace bullying was significantly associated with psychological distress, physician-diagnosed mental disorders, physician-diagnosed respiratory diseases, physical complaints, subjective poor health, sickness absence (≥ 7), lower work performance, and job dissatisfaction, after adjusting for potential

Table 4. Hierarchical multiple regression of bullying and psychological distress, physical complaints, and work performance.

	Psychological distress				Physical complaints				Work performance			
	b	**SE**	**β**	**p**	**b**	**SE**	**β**	**p**	**b**	**SE**	**β**	**p**
Step 1												
Bullied (yes = 1)	0.67	0.06	0.26	**	0.43	0.06	0.19	**	-0.76	0.19	-0.10	**
Not bullied but witnessed bullying (yes = 1)	0.40	0.05	0.20	**	0.19	0.04	0.11	**	-0.11	0.15	-0.02	
Step 2												
Bullied (yes = 1)	0.64	0.06	0.25	**	0.43	0.06	0.19	**	-0.68	0.19	-0.09	**
Not bullied but witnessed bullying (yes = 1)	0.40	0.05	0.20	**	0.19	0.04	0.11	**	-0.14	0.15	-0.02	
Sex (male = 1)	0.03	0.03	0.03		-0.11	0.03	-0.10	**	0.14	0.10	0.04	
Age (under 29 = 1)	0.11	0.04	0.06	*	0.02	0.04	0.02		-0.82	0.12	-0.17	**
Education (high school = 1)	0.00	0.03	0.00		0.03	0.03	0.03		0.06	0.09	0.02	
Household income (<250 = 1)	0.12	0.05	0.06	*	0.09	0.05	0.05		-0.14	0.16	-0.02	
Occupation (manager = 1)	-0.07	0.05	-0.03		0.01	0.05	0.00		-0.14	0.16	-0.02	
Employment (permanent = 1)	0.17	0.04	0.14	**	0.09	0.03	0.08	*	-0.31	0.11	-0.08	**
Step 1												
R^2	0.099	**			0.045	**			0.011	**		
ΔR^2	0.099				0.045				0.011			
F change	82.172	**			35.564	**			8.191	**		
Step 2												
R^2	0.127	**			0.058	**			0.049	**		
ΔR^2	0.028				0.012				0.038			
F change	7.975	**			3.216	*			9.893	**		

b: Partial regression coefficient, β: Standard partial regression coefficient, and R^2: Coefficient of determination.

* $p < .05$

** $p < .01$.

https://doi.org/10.1371/journal.pone.0265863.t004

confounders. Witnessing bullying was also associated with psychological distress, physician-diagnosed mental disorders, physical complaints, subjective poor health, and job dissatisfaction. In addition, victims had 4.5 more days of sickness absence than non-victims, although it was not statistically significant. In contrast, victims had 11.2% significantly lower work performance than non-victims. Overall, our study results suggest that experiencing and witnessing bullying is associated with various health and organizational outcomes. In addition, this study added to the literature that bullying experience was associated with physician-diagnosed diseases, including mental disorders and respiratory diseases.

Workplace bullying was associated with having physician-diagnosed mental disorders under treatment, in addition to the association with psychological distress and physical complaints that were measured by a scale. Additionally, witnessing bullying was also associated with physician-diagnosed mental disorders under treatment. Although a meta-analysis study reported workplace bullying was related to depressive symptoms, anxiety symptoms, PTSD symptoms, and psychological complaints, few studies have focused on physician-diagnosed mental disorders [2, 7]. People who sought psychiatric treatments could have more deterioration in their social functioning than people with non-clinical psychological distress. Thus, physician-diagnosed mental disorders may be a more relevant outcome to assess the health and social impact of workplace bullying. Thus, although causality cannot be determined since

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Table 5. Workplace bullying and physician-diagnosed physical and mental disorders, subjective health, sickness absence, and job satisfaction: Poisson regression analysis.

	Crude		Adjusted †	
Outcome variables:	**Not bullied but witnessed**	**Bullied**	**Not bullied but witnessed**	**Bullied**
	PRs (95% CI)	**PRs (95% CI)**	**PRs (95% CI)**	**PRs (95% CI)**
Mental disorders	**2.91 (1.22 to 6.92)**	**3.93 (1.55 to 10.00)**	**2.91 (1.22 to 6.92)**	**3.93 (1.55 to 10.00)**
Cardiovascular diseases	0.87 (0.49 to 1.54)	0.78 (0.37 to 1.67)	0.90 (0.51 to 1.60)	0.84 (0.39 to 1.82)
Diabetes	0.45 (0.14 to 1.45)	1.26 (0.50 to 3.14)	0.47 (0.15 to 1.49)	1.33 (0.53 to 3.34)
Respiratory diseases	**2.90 (1.23 to 6.86)**	**4.15 (1.67 to 10.34)**	1.62 (0.62 to 4.24)	**3.33 (1.35 to 8.23)**
Digestive diseases	1.36 (0.76 to 2.45)	1.05 (0.46 to 2.41)	1.36 (0.75 to 2.44)	1.14 (0.50 to 2.64)
Orthopedic diseases	1.00 (0.62 to 1.60)	1.31 (0.77 to 2.23)	1.01 (0.63 to 1.62)	1.39 (0.82 to 2.37)
Other chronic diseases	1.36 (0.91 to 2.07)	1.49 (0.90 to 2.46)	1.33 (0.87 to 2.01)	1.51 (0.91 to 2.51)
Poor subjective health	**1.51 (1.19 to 1.93)**	**2.04 (1.56 to 2.66)**	**1.52 (1.19 to 1.94)**	**2.00 (1.53 to 2.61)**
Sickness absence (≥ 1)	1.11 (0.90 to 1.36)	1.21 (0.93 to 1.56)	1.11 (0.90 to 1.37)	1.19 (0.92 to 1.54)
Sickness absence (≥ 7)	1.14 (0.84 to 1.55)	**1.53 (1.09 to 2.15)**	1.14 (0.83 to 1.55)	**1.56 (1.10 to 2.19)**
Job dissatisfaction	**1.60 (1.27 to 2.03)**	**2.04 (1.57 to 2.65)**	**1.61 (1.27 to 2.04)**	**1.99 (1.53 to 2.60)**

† Individual characteristics (sex and age) and SES (education, household income, occupation, and employment status) adjusted in the model.
Reference group: Not exposed nor witnessed workplace bullying.
Bold figures refer to significant results.

having mental disorders was also reported as a predictor of workplace bullying [2, 27], our study results added the literature that exposure to workplace bullying is associated with clinical mental illness in a representative working sample in Japan.

Our finding that exposure to workplace bullying was significantly associated with physician-diagnosed respiratory diseases under treatment was relatively "new" to this field. However, this coincides with an empirical study that reported the association between workplace bullying and asthma among Peruvian cleaners [12] or a qualitative study that reported victims had symptoms of asthma [14]. This is not surprising because stress triggers clinically significant bronchoconstriction or exacerbation of asthma [28, 29]. Moreover, since long-term exposure to stress (life events and appraisals of threat and manageability) can increase susceptibility to respiratory diseases [30], workplace bullying may also trigger or exacerbate such illnesses.

The study results show that both victimization and witness to workplace bullying were associated with subjective poor health and job dissatisfaction. This is in line with the studies that reported exposure to workplace bullying influences job satisfaction in Belgian, Norwegian, Italian, and Spanish samples [31–33]. Although little study investigated the effect of witnessing workplace bullying on individual and organizational outcomes [34, 35], a recent study confirmed the adverse effects of witnessing bullying on job satisfaction, organizational commitments, and turnover intentions after controlling for witnesses' own experiences of being bullied [36]. Our study results also confirmed this association after excluding those who were bullied from witnesses, indicating the existence of workplace bullying influences witnesses'

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motivation and organizational commitment. As previously reported in the longitudinal study, the existence of bullying at the department level increases employees' subsequent psychological distress and intention to leave [22]. Our study also showed that witnesses (those who were not bullied but witnessed) had higher psychological distress and physical complaints scores than those not bullied nor witnessed, while the highest scores were observed among those who were bullied. In contrast, no significant difference was found in sickness absence and work performance between those who did not experience or witness bullying. Thus, further studies are needed to clarify this association.

The study found that victims had 4.5 more days of absenteeism and 11.2% lower work performance in the previous year than non-victims, consistent with studies that reported an association between exposure to bullying and absenteeism and work performance. [11, 16, 17]. Interestingly, this difference in productivity or sickness absence was comparable to a nationwide survey in the UK [20]. They reported that bullying victims were 7% less productive and 7 days more off work during the previous year than employees who were neither bullied nor witnessed [20]. This indicates that workplace bullying affects the productivity of the organization itself and increases organizational costs to replace those who are on sick leave. To prevent individual and organizational losses due to workplace bullying, organizations need to implement further anti-bullying measures.

Several limitations need to be noted. First, the nature of the cross-sectional design precludes determining causality. As reported in several studies, mental health status also predicts bullying victimization [2, 27]. This nature of the association between workplace bullying and mental health may have contributed to the overestimation of the association between bullying and mental disorders in the current cross-sectional study. It is unclear whether physical health status also predicts workplace bullying victimization, but this possibility cannot be ruled out. Longitudinal studies are needed to clarify workplace bullying and various health outcomes and organizational outcomes. Second, this study did not ask for the name of the diagnosis for which the respondent was receiving treatment. Since the disease severity varies, future research should focus on the name of the diagnosis and the severity of the disease. Third, we used a self-labeling method to measure workplace bullying, which has been previously reported to underestimate the prevalence of workplace bullying [37]. Fourth, the possible measurement error may have contributed to underestimating (or overestimating) the association between bullying and sickness absence since sickness absence days were obtained by self-report in this study. If possible, the use of the organizations' official sick leave data would allow for a more objective investigation of the victims' sick leave. Finally, the moderate response rate may also have influenced results unexpectedly. For example, there is a possibility that persons who suffered from serious bullying at work or had a severe mental illness were not willing to answer the questionnaire. Thus, some selection bias may have occurred in this study.

Despite some limitations, the strength of this study is the use of a representative Japanese sample, and the results of this study can be generalized to the general Japanese workforce population. Another strength is that we investigated various physician-diagnosed clinical-level diseases. As mentioned in the introduction, quantitative studies on workplace bullying and physical diseases are still scarce [6]. The authors believe that this study will encourage future research in this field, as it showed a link between workplace bullying and physician-diagnosed diseases such as mental disorders and respiratory diseases. Finally, another strength of this study is that it focuses on both victims and witnesses of workplace bullying. As previous studies have suggested, witnesses of bullying also suffer from mental illness [22], but this is often neglected in research. Future research should focus on the various health problems of both victims and witnesses of bullying in order to understand the adverse effects of workplace bullying as a whole.

Conclusions

The study found that victimization and witnessing workplace bullying were significantly associated with psychological distress, physician-diagnosed mental disorders, physical complaints, subjective poor health, and job dissatisfaction. Furthermore, workplace bullying victimization was associated with physician-diagnosed respiratory disorders, sickness absence (≥7), and poor work performance. To prevent individual and organizational losses due to workplace bullying, organizations need to implement further anti-bullying measures.

Acknowledgments

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