# Implementation and effectiveness of the Stress Check Program, a national program to monitor and control workplace psychosocial factors in Japan: a systematic review. Translated secondary publication

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## Abstract

**Purpose** – The purpose of this paper is to conduct a comprehensive review on the implementation and the effect of Japan's Stress Check Program, a national program to monitor and control workplace psychosocial factors that was initiated in December 2015.

**Design/methodology/approach** – We comprehensively reviewed articles published in Japanese and English, assessed the performance of the Stress Check Program and summarized future challenges. We also discussed the implications for practice.

**Findings** – The available literature presented a scientific basis for the efficiency and validity of predictions using the Brief Job Stress Questionnaire, which is the instrument recommended to screen workers with high stress in the program. No study has verified the effect of the program on workers' mental health by using group analysis of stress check results. There is room for improvement in tools that contribute to identifying workers with high stress and in measures for improving the work environment. The Stress Check Program contrasts with risk management of psychosocial factors at work, widely adopted in European countries as a strategy for improving workers' mental health by focussing on the psychosocial work environment.

**Practical implications** – Although the effectiveness of the Japanese program needs further evaluation, future developments of the program would provide insight for national policies on psychosocial risks/psychosocial stress at work.

**Originality/value** – This paper is the first systematic review on the implementation and effects of Japan's Stress Check Program.

**Keywords** The stress check program, Brief job stress questionnaire, Occupational health system, Work environment improvement, Japan

**Paper type** Literature review

## Introduction

Workers' mental health has been one of the biggest issues in Japan as is often the case in many other developed countries. As of 2014, a total of 1,456 claims were submitted requesting worker compensation for work-related mental disorders, and among these, 213 were suicide-related. The number of claims for mental disorders had steadily increased almost five times during the previous 14 years. Japanese government came up with several remedies to address the growing problem of work-related mental disorders, including the amendments of Industrial Health and Safety Law and the release of guidelines to enhance effectiveness of the law. In sheer numbers of claims requesting compensation, however, it appeared that the remedies had only limited effects in improving workers' mental health. In 2014, this law was extended to include a Stress Check Program – the first mandated policy in the history of mental health in workplaces in Japan (Kawakami and Tsutsumi, 2016; Tsutsumi, 2016).

The Stress Check Program requires enterprises to implement an annual test (stress check) to gain understanding of the psychological burdens placed on their workers. Enterprises with fewer than 50 workers (small-scale enterprises) are only obligated to make reasonable efforts in this regard. Currently, the Stress Check Program is implemented in two ways. First, following preparation for implementation, a stress check is performed for all workers within an enterprise, and each worker is notified of their results. Based on these results, an interview with a physician is offered for those under high levels of stress (mandatory). Second, personal results are summarized and analysed for groups of a certain size, and group analysis used to improve the work environment (referred to as "reasonable efforts"). The Stress Check Program is the primary preventative measure for mental health issues among workers in Japan. Specifically, key functions of the Stress Check Program are: building awareness of workers' stress; providing support for self-care and improvement of the work environment based on test results. The stress checks mean that workers under high stress can be identified, including those who require professional support; this allows for secondary preventative measures to identify and respond to mental health issues (regarded as secondary objectives).

The Stress Check Program is part of a series of measures for workplace mental health in Japan (Kawakami and Tsutsumi, 2016; Tsutsumi, 2016). These measures must be enacted holistically to ensure maximum returns from implementation of the Stress Check Program. However, verifying evidence from individual activities within the Stress Check

Program will be useful to inform efforts to further improve the program. These activities include: verifying test tools to identify high level of stress (the recommended tool is the Brief Job Stress Questionnaire [BJSQ]); implementing a routine survey for workers to reduce mental health risks through sharing results with each worker; screening for workers under high levels of stress to prevent mental health issues through interviews with physicians and reduction in psychological stress responses by improving work environments based on group analysis (including education for managers and supervisors) (Tsutsumi *et al.*, 2018).

We comprehensively reviewed articles published in Japanese and English that focussed on the implementation and effects of the Stress Check Program, assessed the performance of the Stress Check Program for the first three years after initiation and summarized future challenges. The present study is the first systematic review focussed on the implementation and effects of the Stress Check Program. In this review, we examined the evidence on: (1) implementation of the Stress Check Program, (2) utility and validity of tools for stress checks and (3) effects of the Stress Check Program. We also discussed what the relevance of the Stress Check Program as implemented in Japan is to other countries, by comparing the policy and the components of the program with the trends in the management of psychosocial factors at work according to the policies and guidelines of international bodies and other countries. This evaluation and recent development of the national program may provide useful information for international readers who are interested in national policies on psychosocial risks/psychosocial stress in the workplace.

## Methods

A search of Japanese language papers was performed using Ichushi Web (Japan Medial Abstracts Society) on 17 April 2019. Papers published in English were searched using MEDLINE (PubMed) on 27 March 2019. The target publication dates were within five years before initiation of the present study (2019), giving a start date of 1 January 2014. Japanese language papers were searched using the key search term "*sutoresuchekkuseido*" (stress check program), with types of papers limited to original articles and case reports using an Ichushi web filter function. English language papers were searched using the formula "((stress AND check) OR stress-check) AND Japan*." Titles, abstracts and full texts of returned papers were read by the authors and papers that met the following criteria were included. Eligibility criteria for Japanese language papers were as follows: (1) published in Japanese; (2) covered legislated content of the Stress Check Program (content in accordance with the Stress Check Program for those that used data before the legislation); (3) included stress checks as content and used a questionnaire that measured job stressors, stress responses and social support (program requirement) and (4) were not review articles, conference abstracts, commissioned reports, or papers not peer-reviewed. Eligibility criteria for English language papers were as follows: (1) published in English; (2) conducted after the introduction of the Stress Check Program; (3) focussed on the implementation, impact or challenges of the Stress Check Program or on the scientific bases for the questionnaire used for the program, and based on quantitative or qualitative data and (4) were peer-reviewed. In cases where it was difficult to determine whether a paper was related to the legislated Stress Check Program, all of the present authors made a consensus judgement on whether to include or exclude that paper. Included papers were summarized based on: (1) implementation of the Stress Check Program; (2) utility and validity of Stress Check tools and (3) effects of the Stress Check Program.

## Results

The literature search identified 114 papers from the two databases: 60 Japanese language papers and 54 English language papers, with 18 papers finally included in this review (Figure 1). Of the 60 Japanese language papers, we excluded: papers written in English

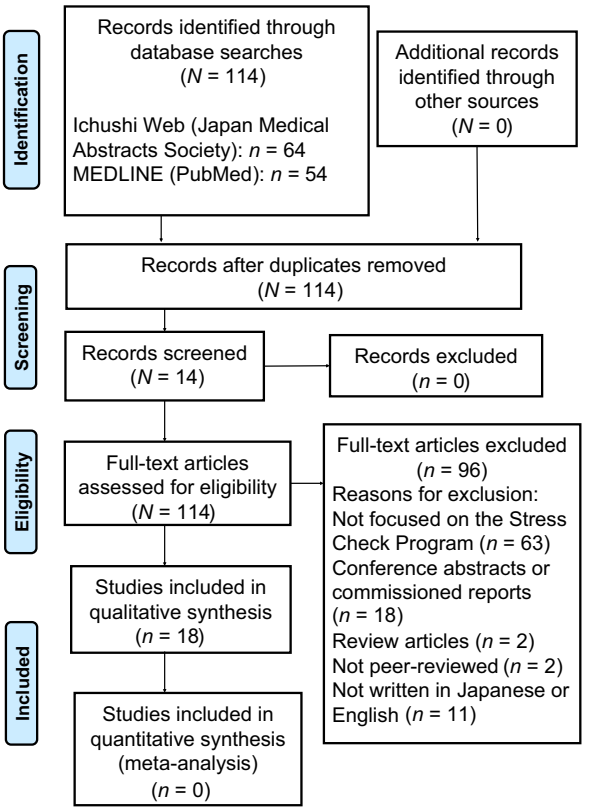


**Figure 1.**
PRISMA flow diagram

($n$ = 5); papers with inconsistent content ($n$ = 18), including unrelated content ($n$ = 12), preliminary tests before implementation of the program ($n$ = 2) and studies without a questionnaire that measured job stressors, stress responses and social support ($n$ = 4); conference abstracts ($n$ = 12); commissioned reports ($n$ = 6); papers that were not peer-reviewed ($n$ = 2) and reviews ($n$ = 2). This left 15 Japanese language papers for inclusion in our review. Of the 54 English language papers, we excluded papers written in Japanese ($n$ = 6) and papers with inconsistent content ($n$ = 45), including those with unrelated content ($n$ = 42) and reviews without data ($n$ = 3). Finally, three English language papers were included in this review.

*Implementation of the stress check program*

Among the 18 papers included in this review, nine examined the implementation of the Stress Check Program (Table 1). Of these nine papers (including duplicates), three papers reported on the implementation rate of the Stress Check Program, six on the examination rate of the Stress Check Program, five on the prevalence of those under high levels of stress, two on the implementation rate of interviews with physicians and two on group analysis and implementation rate of improvements in the workplace environment. In this paper, we used the term "implementation rate", to refer to the proportion of enterprises that actually implemented the Stress Check Program or parts of the program (e.g. physician interview and

| Author(s) (year) | Study objectives | Methods | Participants | Main results |
|---|---|---|---|---|
| Tsutsumi *et al.* (2018) | Examine the ability of the BJSQ (recommended by the SC program) to predict workers needing long-term sick leave | Questionnaire (longitudinal) | 14,178 workers (7,356 men, 7,362 women) at an independent financial services company (administrative employees, temporary transferred persons, overseas employees, absentees and dispatched employees were excluded) | *Implementation*: The prevalence of those identified as under high levels of stress by the BJSQ was 5.6% for men and 15.0% for women<br>*Utility*: Workers who were identified as under high levels of stress by the BJSQ (based on SC program implementation manual assessment criteria) had a significantly high risk for long-term sick leave<br>*Challenges*: Effects of three elements of the SC program need to be confirmed. 1. Reducing the risk for mental health issues through implementation of routine survey for workers and returning the results to workers. 2. Preventing mental health issues through screening for those under high levels of stress and providing interviews by physicians. 3. Reducing psychological stress reactions by improving the work environment (including education for management and supervisors). Because risk for sick leave in those under high levels of stress rapidly increased after 2–3 months, occupational health staff needs to consider measures for those under high levels of stress immediately after SC implementation |

(*continued*)

**Table 1.**
Implementation and effects of the Stress Check Program: literature incorporated in this systematic review (18 papers)

Table 1.

| Author(s) (year) | Study objectives | Methods | Participants | Main results |
|---|---|---|---|---|
| Asai *et al.* (2018) | Implementation of the SC program during its first year and investigation of the utility of each element with anticipated effects under the SC program | Questionnaire (cross-sectional) | 3,891 full-time workers | *Implementation*: At workplaces with ≥50 workers, 52.5% reported they had been notified of the SC program implementation, and the examination rate was 92.0%. In addition, 14.2% were under high levels of stress, of which 18.6% requested an interview with a physician. Overall, 3.3% of workers that received the SC experienced improvements to their work environment |
| Takeishi *et al.* (2017) | Investigate implementation status of the SC in small-scale workplaces in Saitama Prefecture | Questionnaire (cross-sectional) | 38 small-scale workplaces in Saitama Prefecture | *Implementation*: The SC implementation rate was low (34%). The most common reason for not implementing the SC was because of the "obligation to make efforts." In regard to scheduling group analysis, among 10 workplaces (after excluding those without a plan), eight workplaces (80%) indicated they would implement group analysis<br>*Challenges*: Administrative complications, such as considerations regarding privacy and financial burden, were also cited as issues that inhibited implementation SC. |

(*continued*)

Table 1.

| Author(s) (year) | Study objectives | Methods | Participants | Main results |
|---|---|---|---|---|
| Saito *et al.* (2019) | Clarify mental health measures and implementation of SC in small-scale workplaces along with related factors and obtain suggestions for future promotion | Questionnaire (cross-sectional) | Workplaces with 30–50 workers in Aichi Prefecture (290 independent companies and 331 branches) | *Implementation*: The SC implementation rate was higher in branches (56%) compared with independent companies (15%)<br>*Efforts*: In workplaces with mental health staff, SC implementation was more advanced compared with workplaces without such staff. Assigning dedicated staff in small-scale workplaces would be useful to promote SC |
| Ishimaru *et al.* (2018) | Examine if conducting SC simultaneously with the annual health examination improved the SC examination rate | Questionnaire (cross-sectional) | 31,356 workers who used both the SC service and the annual health examination | *Implementation*: The total SC examination rate was 90.8%. The examination rates of workers aged ≥30 years, those with occupations such as transportation and postal services, and workplaces with 50–999 workers, were high. However, the examination rates for medical and welfare-related jobs and workplaces with ≥1,000 workers were low<br>*Efforts*: If the SC date was close to the annual health examination, the examination rate increased by about 1.7–3.8 (odds ratio); implementing the SC close to the annual health examination may improve the examination rate |
| Muratani (2017) | Compare sex and age groups, and administrative/educational staff to clarify workplace stress | Questionnaire (cross-sectional) | 683 workers at a school (university and junior college) | *Implementation*: 531 people underwent the SC (examination rate of 78%); 11% were under high levels of stress |

(*continued*)

Table 1.

| Author(s) (year) | Study objectives | Methods | Participants | Main results |
|---|---|---|---|---|
| Nakatani (2017) | Examine the necessity of improvements to the work environment through analysis of workers under high levels of workplace stress | Questionnaire (longitudinal) | 1,009 full-time workers who received an SC two years in a row (830 men, 179 women) | *Implementation*: The SC examination rate was 100% in 2016 and 99.6% in 2017. Among 1,009 workers who completed the SC in both years, 5% were under high stress in both years, 6% in 2016, and 6% in 2017; 83% were not considered under high stress |
| Tsutsumi *et al.* (2017) | Examine the ability of the BJSQ recommended to identify workers who present psychological stress reactions equivalent to severe mental disorders | Questionnaire (cross-sectional) | 1,650 workers registered with an online survey company | *Implementation*: In surveys that used the BJSQ based on the evaluation criteria of the SC Program implementation manual, the prevalence of those under high levels of stress was 16.7% with the 57-item version and 15.5% with the short version (23 items)<br>*Utility*: High-stress screening using the cut-off values from the implementation manual had 60.5% sensitivity and 88.9% specificity when K6 score of ≥13 was used as the outcome indicator<br>*Challenges*: Among those under high levels of stress, less than half presented psychological a stress reaction equivalent to a severe mental disorder |
| Wada *et al.* (2018) | Clarify the situation of occupational health activities for medical staff | Questionnaire (cross-sectional) | 214 medical facilities in Kanto Region | *Implementation*: 92.5% of medical facilities had a system to implement occupational health interviews for those who were deemed under high-level stress and wanted an interview with a physician |

(*continued*)

| Author(s) (year) | Study objectives | Methods | Participants | Main results |
|---|---|---|---|---|
| Adachi *et al.* (2018) | Verify the correlation between screening criteria for an interview with a physician and psychological health | Questionnaire (cross-sectional) | 368 workers (288 men, 80 women) at an independent company | *Utility*: Correlation between BJSQ stress reaction scale score (total of 29 items) and CES-D score was examined. There was strong correlation (Spearman's rank correlation coefficient = 0.800, $p < 0.001$) |
| Takahara (2018) | Examine concrete clues to improve workplaces by implementing a multivariate analysis including objective workplace indicators | Questionnaire (longitudinal) | 1,895 workers including non-regular workers at an independent company | *Utility*: A survey that included BJSQ items was conducted and its relationship with voluntary retirement examined. Individual job satisfaction measured with the BJSQ, and satisfaction with work and life at the workplace level had a significant negative correlation with voluntary retirement |
| Adachi (2017) | Gain an understanding of situations in workplaces to achieve work engagement and prepare essential documents to examine approaches in occupational fields | Questionnaire (cross-sectional) | 368 workers (288 men, 80 women) at an independent company | *Utility*: BJSQ items that are strongly correlated with job satisfaction were examined for each gender. For men, the significance of work, control at work, support from superiors, job aptitude and workload were significantly correlated with job satisfaction. For women, significant factors were job aptitude, significance of work and workload |
| Higuchi *et al.* (2015) | Analyse longitudinal BJSQ data and examine items that would impact on subsequent work | Questionnaire (longitudinal) | 661 male workers at a machine manufacturing plant | *Utility*: Using the BJSQ items at the baseline, deterioration in job aptitude and related factors for the subsequent four years were examined. Levels of physical burden, job satisfaction and support from superiors were significantly correlated with deterioration in job aptitude |

(*continued*)

**Table 1.**

Table 1.

| Author(s) (year) | Study objectives | Methods | Participants | Main results |
|---|---|---|---|---|
| Shimura *et al.* (2018) | Examine the relationship between sleep-related issues and stress reaction in the SC | Questionnaire (cross-sectional) | 884 workers at 10 workplaces | *Utility*: Using structural equation modelling that combined sleep-related issues (measured with the Pittsburgh Sleep Quality Index) with factors of stress at work and support from others in the BJSQ showed that 55.2% of psychological and physical stress reaction was explained by these factors |
| Ito (2017) | Develop a simple and convenient depression assessment scale (Ji test) | Questionnaire (cross-sectional) | 91 new patients at a clinic | *Utility*: Physicians providing interviews may not be familiar with mental disorders; therefore, a support tool to accurately assess risk for mental health issues is necessary |
| Imamura *et al.* (2018) | Examine the link between implementation of SC based on the SC Program, improvements to the work environment, psychological stress reactions and work performance | Online survey (longitudinal) | 3,891 workers registered with an online survey company (part-time workers were excluded) | *Effects*: Workers who reported both SC and improvements to their work environment had significantly lower psychological stress reactions compared with those who did not report either |
| Ito *et al.* (2016) | An online SC program that provided individual results and advice for decreasing stress, influencing factors and current measures was examined as to whether this approach promoted motivation to implement stress coping | Questionnaire (longitudinal) | 371 workers voluntarily participated in a survey that used an online SC program and provided responses to three rounds of the survey | *Effects*: Immediate feedback was provided to participants using an online system that provided individual results and advice on stress, related factors and measures based on responses to the questionnaire<br>Compared with before use of this system, motivation to implement stress coping and awareness of the features of stress management were improved. Motivation to implement stress coping was maintained for two months, which led to maintenance of psychological health |

(*continued*)

Table 1.

| Author(s) (year) | Study objectives | Methods | Participants | Main results |
|---|---|---|---|---|
| Shintani *et al.* (2018) | Interviews with all employees performed after SC, and training was provided based on its content, to verify whether this approach improved factors associated with stress and stress reactions | Questionnaire (longitudinal) | All 168 workers (134 men, 34 women) at a food manufacturing company | *Effects*: This study investigated if implementing interviews for all employees, stress self-care training for individual employees and training for management and supervisors after SC improved factors associated with stress and stress reactions. Factors associated with stress increased role-related conflict and reduced skill usage. Physical stress reactions were reduced but psychological stress reactions were not Efforts: It is important to provide mental health training for employees by offering interviews to all employees as a follow-up to the SC and by using the contents of the SC |

**Note(s)**: SC: stress check; BJSQ: Brief Job Stress Questionnaire; CES-D: Center for Epidemiologic Studies Depression Scale

workplace improvement), and "examination rate", to refer to the proportion of workers who underwent stress checks among those who were expected to do so.

*Implementation rate of the Stress Check Program*

Asai *et al.* (2018) conducted an online survey with 3,891 full-time workers across Japan to clarify the implementation status of the Stress Check Program in its first year. They found that among respondents working at enterprises with ≥50 workers, 52.5% had received notification of the implementation of the Stress Check Program. Stratified analyses based on respondents' demographics revealed that notification of program implementation was more common among workers aged 40–49 years and those in manufacturing positions. An analysis based on the scale of enterprises showed that larger enterprises had more workers who received notification. That study also reported that 12.1% of workers at small-scale enterprises had received a notification of the implementation of the Stress Check Program from their employer.

In addition, two reports examined small-scale enterprises. Takeishi *et al.* (2017) conducted a survey of 38 small-scale enterprises in Saitama Prefecture and reported a low implementation rate of stress checks (13 workplaces, 34%). The most common reason for not implementing the Stress Check Program in small-scale enterprises was because they were only obliged to make "reasonable efforts." Saito *et al.* (2019) examined the implementation rate of stress checks in small-scale enterprises in Aichi Prefecture by dividing them into independent companies ($n = 290$) and branches of companies with multiple locations ($n = 331$; e.g. offices, branches, sales offices). The results showed that the implementation rate of stress checks was 15% for independent enterprises and 56% for branches, which clearly showed a difference based on enterprise size. That study also reported that enterprises with mental health staff had significantly higher implementation rates of stress checks than enterprises without mental health staff.

*Examination rate of stress checks*

The nation-wide survey by Asai *et al.* (2018) showed that among workers who were notified of the Stress Check Program, 92.0% actually underwent stress checks at enterprises with 50 or more workers, and 84.7% underwent stress checks at small-scale enterprises. Ishimaru *et al.* (2018) used data for 31,156 workers who received both a stress check from an occupational health agency and a routine health checkup, and they reported that 90.8% of workers had received a stress check. In terms of the scale of enterprises, stress checks were reported by 91.1% of workers at enterprises with ≥50 workers and 87.3% of workers at small-scale enterprises. In addition, that study reported the examination rate varied based on workers' attributes. A higher examination rate was reported among workers aged ≥30 years, those with occupations such as construction, transportation and postal services and those in enterprises with 5–999 workers compared with workers aged 1–29 years, those in manufacturing jobs and those in enterprises with 1–49 workers. However, those in occupations such as medical and welfare services and who worked in enterprises with ≥1,000 employees had significantly lower examination rates compared with those in manufacturing jobs and enterprises with 1–49 workers. In addition, stress checks implemented on dates closer to routine health checkups had higher examination rates.

Muratani (2017) reported the stress check examination rate was 78% in an academic institution (a university and junior college) with 683 staff. Nakatani (2017) reported that the examination rate of stress checks implemented over two years at corporate groups that included multiple occupations (e.g., sales, manufacturing, and distribution) was 100% in 2016 and 99.6% in 2017. However, the examination rate for workers at each workplace was not reported in the two papers that examined small-scale enterprises (Saito *et al.*, 2019; Takeishi *et al.*, 2017).

*Prevalence of workers under high levels of stress*

Asai *et al.* (2018) reported that among workers who received a stress check, the prevalence of workers who were identified as under high levels of stress was 14.2% in enterprises with ≥50 workers and 14.4% at small-scale enterprises. Tsutsumi *et al.* (2017) conducted an online survey involving 1,650 workers. They reported that the prevalence of workers under high levels of stress as determined using the BJSQ (Shimomitsu, 2000) based on the assessment criteria indicated in the Stress Check Program Implementation Manual (Ministry of Health, Labour and Welfare, Japan, 2015) (referred to as the Manual) and according to the Industrial Safety and Health Act was 16.7% with the 57-item version and 15.5% with the 23-item (short) version. In addition, Tsutsumi *et al.* (2018) conducted a prospective cohort study with 14,718 workers at a financial service company (7,356 men, 7,362 women) and reported that the prevalence of workers under high levels of stress calculated with similar assessment criteria (57-item version of the BJSQ) was 5.6% for men and 15.0% for women. The survey of the academic institution (university and junior college) found that 11% of staff was under high stress (Muratani, 2017). In addition, the study focussed on stress checks among workers at corporate groups (sales, manufacturing and distribution) concluded that among 1,009 full-time workers who received stress checks in 2016 and 2017, 5% were under high stress in both years, whereas 6% were under high stress in 2016 and 6% reported high stress in 2017 (Nakatani, 2017). That study also reported that 83% of workers were not under high stress in either year.

*Implementation rate of interviews with physicians*

Asai *et al.* (2018) found that among workers who received a stress check, 2.6% requested an interview with a physician at enterprises with ≥50 workers, whereas no workers made such request at small-scale enterprises. That study also reported that among those who were identified as under high stress, 18.6% of those at enterprises with ≥50 workers requested physician interviews, whereas no workers small-scale enterprises made such a request.

In this study, workers were asked for the reasons why not they requested an interview with a physician at enterprises. The followings were the reasons that workers with high stress did not see a doctor: did not receive notice, 19%; forgot to request 1%; had no time, 20%; felt no need, 29%; did not know how useful the interview was, 36%; the problem was solved, 1%; did not think they had stress, 3%; thought they could cope with by themselves, 14%; felt no special need because they consulted on a regular basis, 4%; already saw a doctor, 4%; did not want to let the company know the results, 10%; were anxious about the fact that they saw a doctor being introduced to the company, 11%. Wada *et al.* (2018) surveyed 214 medical facilities in the Kanto region and examined implementation of interviews with physicians for those with high levels of stress. They found that 92.5% of medical facilities indicated they had a system ready to implement interviews with occupational physicians for those identified as under high stress that wished to have such a meeting.

*Implementation rate of group analysis and work environment improvement*

In the national survey by Asai *et al.* (2018), 3.3% of workers who received a stress check reported that their work environment was improved. The survey by Takeishi *et al.* (2017) that targeted small-scale enterprises found that eight of the 10 companies surveyed (80%) indicated that they would "implement" group analysis.

*Utility and validity of tools for stress checks*

Eight of the 18 reviewed papers examined the utility and validity of the BJSQ for the Stress Check Program (Table 1). Three papers examined the relationship between BJSQ scores and mental health indicators, three examined the relationship between the BJSQ and work-related factors and two discussed the necessity of supplementary tools.

*Relationship between BJSQ scores and mental health indicators*

Adachi and Inaba (2018) examined the relationship between scores on the BJSQ stress response scale (total of 29 items) and the Center for Epidemiological Studies-Depression scale (a depression self-assessment scale) in a cross-sectional study involving 368 workers at an enterprise (288 men, 80 women). That study revealed a strong correlation between the scores for the two scales (Spearman's rank correlation coefficient = 0.800, $p < 0.001$).

Tsutsumi *et al.* (2017) changed the assessment criteria (i.e., the cutoff value) to screen for high stress using the BJSQ as indicated in the Manual (Ministry of Health, Labour and Welfare, Japan, 2015) and examined the screening efficiency of the Kessler Screening Scale for Psychological Distress (Furukawa *et al.*, 2008; Kessler *et al.*, 2002), with a score of 13 or higher (equivalent to a severe mental disorder) being the outcome indicator. The results showed that when the cutoff value (stress responsescore of ≥77) in the Manual was used, the prevalence of those with high stress was 16.7%, with sensitivity of 60.5%, specificity of 88.9%, Youden index of 0.504, positive predictive value of 47.3% and negative predictive value of 93.8%. The highest screening efficiency (highest Youden index) was observed when the cutoff value was lowered to 65, where the prevalence of those with high stress increased to 32.3% and the positive predictive value dropped to 33.0%.

Similarly, Tsutsumi *et al.* (2018) examined the relationship between presence/absence of high stress at baseline (determined based on the assessment criteria in the Manual (Ministry of Health, Labour and Welfare, Japan, 2015) and long-term sick leave of ≥1 month during the following year (obtained from human resources data) using a Cox proportional hazards model. The results showed that compared with those who were not under high stress, those with high stress had a long-term sick leave risk due to subsequent mental health issues. The hazard ratios (adjusted for age, years of work, occupation, position, and receiving an interview with occupational health staff after the stress check) were 8.68 for men and 3.67 for women. The equivalent population-attributable risk proportion was 30.1% for men and 25.6% for women.

*Relationship between BJSQ scores and work-related factors*

Takahara (2018) conducted a survey that included items from the BJSQ with 1,895 temporary workers from a single company and examined the relationship between scores for these items and workers' voluntary retirement. They found that personal-level job satisfaction, workplace-level satisfaction and life satisfaction, as measured by the BJSQ, had a significant negative correlation with voluntary retirement.

Adachi (2017) examined BJSQ items that were strongly related to job satisfaction for 368 workers at a single company (288 men, 80 women) based on sex. The results showed that for men, factors that were significantly correlated with job satisfaction were the significance of work, control at work, support from superiors, aptitude in work and the amount of work. For women, aptitude at work, significance of work and the amount of work were significantly correlated with job satisfaction.

Higuchi *et al.* (2015) used BJSQ items at a baseline assessment for 661 male workers at a machine manufacturing factory to examine factors related to deterioration in respondents' job adaptability in the subsequent four years. They found that levels of physical burden, job satisfaction and support from superiors were significantly related to deterioration in job adaptability.

*Necessity of supplementary tools*

Shimura *et al.* (2018) used structural equation modelling, in which sleep-related issues (identified with the Pittsburgh Sleep Quality Index) were added to factors of stress and support at work drawn from the BJSQ. They showed that 55.2% of psychological and

physical stress could be explained through these factors. Those authors argued for the importance of also addressing sleep-related issues in stress checks. Ito (2017) noted that because the physicians that conduct interviews with those under high levels of work stress are not necessarily familiar with mental disorders, a support tool to accurately evaluate the risk for mental health issues is necessary. Therefore, that study proposed the use of a depression screening test (Ji test) that could be easily used in the Stress Check Program.

*Effects of the Stress Check Program*

Among the 18 papers reviewed, three examined the effects of the Stress Check Program (Table 1). One paper examined the effects of improvements in the work environment, one examined the effect of the method by which the stress check results were shared with individuals and the last paper examined the effects of other combined approaches.

Imamura *et al.* (2018) examined the links between implementation of improvements to the work environment through the Stress Check Program, stress responses and work performance. That study included data for 3,891 full-time workers that completed surveys before and after the Stress Check Program (November 2015 and February 2016) (the same subjects as used in the national survey by Asai *et al.* (2018)). A follow-up survey was conducted one year later, in which participants were interviewed about to whether they received a stress check at their workplace and if there had been any improvements to their work environment. Participants were divided into groups based on whether they had completed stress checks and experienced work environment improvements: "neither" (53.9%), "stress check only" (40.5%), "improvement to work environment only" (3.0%) and "both" (2.6%). Possible differences in changes to psychological stress responses and work performance scores were examined. The "both" group had significantly lower stress responses compared with the "neither" group. Imamura *et al.* (2018) concluded that implementation of the stress check as mandated by the Stress Check Program alone may not be effective in reducing the stress responses of workers and may be more effective in combination with improvements to the work environment.

In terms of sharing the stress check results with workers, Ito *et al.* (2016) reported on sharing the results of a questionnaire that involved 371 workers at an information technology (IT) company using an Internet-based system. Respondents' stress status, related factors, individual stress management results and related advice were immediately provided by the system based on their answers to a questionnaire. That study showed that when the stress check results were conveyed to respondents using this system, respondents were more aware of the characteristics of stress management and more motivated to implement measures compared with before the intervention. The desire to implement measures continued for two months, and this maintained motivation impacted the maintenance of psychological health. A reason for this result may be that it was effective to have information in the individual report such as: the importance of having repertoires of measures for coping with stress on a daily basis, meaning multiple measures could be used as appropriate when individuals faced various stress-related factors and stressful situations; advice on how changes in mood and perspective could be useful in reducing work-related stress and specific examples that could be incorporated to everyday situations.

In another combined approach, Shintani *et al.* (2018) examined improvements in stress-related factors and stress responses after implementing the stress check following several strategies: interviewing all workers, providing stress self-care training for individual workers and providing training for managers and supervisors. Participants were workers at a food manufacturing company (168 total: 134 men, 34 women). In terms of stress-related factors, they reported role-related conflicts increased and skill use declined. With regard to stress responses, there was improvement in physical stress responses but no improvement in

psychological stress responses. The reason for the lack of improvement in stress-related factors may have been related to insufficient sorting of detailed tasks, which could have led to inefficient use of workers' skills.

## Discussion

### *Implementation of the Stress Check Program*

This review showed the implementation rate of the Stress Check Program was 53% at enterprises with ≥50 workers and 12–56% at small-scale enterprises. However, the national survey by Asai *et al.* (2018) was conducted in the early December of 2016, and numbers from any subsequent surveys were not included. Therefore, implementation rates for the following three years (2017–2019) may be expected to be higher (Asai *et al.*, 2018). According to the report on the implementation of the Stress Check Program prepared by the Ministry of Health, Labour and Welfare based on the reports submitted by enterprises to labour standards inspection offices (2017) (Ministry of Health, Labour and Welfare, Japan, 2017a), the Stress Check Program was implemented at 82.9% of enterprises in which it was mandated. In a survey that included workers at small-scale enterprises, which are not legally mandated to implement the Stress Check Program, implementation rates tended to be underestimated (Imamura and Kawakami, 2017); therefore, caution is needed when evaluating the program implementation rate in small-scale enterprises. However, implementation rates tended to below in small-scale enterprises, especially small-scale independent enterprises (Saito *et al.*, 2019). The official report on the Stress Check Program implementation (2017) (Ministry of Health, Labour and Welfare, Japan, 2017a) presented implementation rates for each type of enterprise, which were particularly low in the hospitality and entertainment, cleaning and animal husbandry areas.

Within the scope of the survey, the examination rate of the stress check exceeded 90% in workplaces with≥50 or more workers and 80% in workplaces with <50 workers. In terms of occupation, the examination rate was particularly low for medical workers (Saito *et al.*, 2019) and educators (Muratani, 2017).

Although stress levels may depend on the individual workplace, 10–15% of workers on average were identified as under high levels of stress. However, only a limited number of workers received an interview with a physician. According to the 2017 Ministry of Health, Labour and Welfare report (Ministry of Health, Labour and Welfare, Japan, 2017a), among all those examined (examination rate of 78.0%), only 0.6% received an interview with a physician.

According to the survey by (Asai *et al.*, 2018), 3.3% of workers that received a stress check reported that their work environment had improved (Asai *et al.*, 2018). If workers were not involved in these changes to the work environment, it is likely that many workers may be unaware of improvements to their work environment, which could have resulted in underestimation of workplace improvements. In a subsequent national survey (Ministry of Health, Labour and Welfare, Japan, 2017b), the implementation rate was reported as 69% for enterprises with ≥50 workers and 58.3% overall. In the same survey, more than 70% of workplaces conducted group analyses using the stress check results, but specific details are unknown. In the survey of workplaces across Japan conducted by Kawakami (2012), the proportion of workplaces where any measures to improve the work environment were implemented after the stress checks increased from 37.0% in 2016 to 44.2% in 2017. However, many of these measures were "reporting and providing explanations to management," whereas only 4–7.5% of workplaces implemented "participatory improvements to the work environment" that were considered effective in reducing workers' stress.

Implementation rates, examination rates and use of results for group analysis (including those separated by the scale of enterprises and industry) are important indicators in the distribution of

the Stress Check Program, and a further detailed survey is necessary. The reviewed literature showed that to further promote the Stress Check Program among small-scale enterprises, it is important to increase implementation efforts, such as tackling projects by appointing someone in charge of promoting mental health (Saito *et al.*, 2019) and implementing a stress check with routine health checkups (Ishimaru *et al.*, 2018). The literature also showed the necessity of managing the financial burden and other complexities, such as privacy in implementing stress checks, while making sure that the subsidy system is well known (Takeishi *et al.*, 2017).

*Utility and validity of tools used for stress checks*

The BJSQ has a certain level of validity for mental health-related outcomes (Adachi and Inaba, 2018; Tsutsumi *et al.*, 2017; Tsutsumi *et al.*, 2018) and work-related outcomes (Adachi, 2017; Higuchi *et al.*, 2015; Takahara, 2018). Specifically, the fact that a high level of stress has over a 25% population-attributable risk for mental health-related sick leave (Tsutsumi *et al.*, 2018) indicated that the BJSQ is a valid measure to identify high-risk groups for mental health issues. Although there is no evidence since the Stress Check Program started, the "Job Stress Assessment Diagram" that was prepared based on BJSQ responses to visualize health risks associated with job stressors has shown positive effects on the improvement of work environments (Kobayashi *et al.*, 2008; Tsutsumi *et al.*, 2009), and was used as a tool for group analysis in many studies.

Overall, the effectiveness of the Stress Check Program has not been shown for stress-related factors that are not identified by the Job Stress Assessment Diagram (i.e. factors other than workload, control at work and support at work). It is therefore necessary to examine whether unused items could be useful to understand high stress and inform measures to improve work environments. Although they may differ between industries, "subjective physical burden," "job satisfaction," "significance of work," and "aptitude at work" (for which the link with work-related factors has been shown) may be items that could provide useful information for stress-related measures (Adachi, 2017; Higuchi *et al.*, 2015; Takahara, 2018). However, further empirical findings are needed.

Screening of those under high levels of stress by the BJSQ using assessment criteria as specified in the Manual (Ministry of Health, Labour and Welfare, Japan, 2015) is considered useful (Tsutsumi *et al.*, 2017). However, among those identified as under high stress, less than half presented psychological stress responses equivalent to a severe mental disorder; therefore the ability to screen individuals during implementation of the Stress Check Program has limitations. It is necessary to verify if it is useful to consider sleep-related issues (Shimura *et al.*, 2018), combining the BJSQ with supplementary tests (e.g. an assessment scale for depression (Ito, 2017)) and other related tools.

*Effects of the stress check program*

*Reducing the risk for mental health issues through conducting routine surveys of workers and sharing the results.* A previous randomized controlled trial did not support the idea that providing feedback from stress surveys to workers reduced the risk for mental health issues (Kawakami *et al.*, 1999; Ketelaar *et al.*, 2013). The present review found one study that showed that sharing individual results and providing advice to improve issues using an IT-based system improved awareness of stress management and motivation to implement measures (Ito *et al.*, 2016). However, that study was a before-and-after trial conducted without controls. Whether the immediacy of feedback from a stress check and the validity of advice can contribute to its effectiveness need to be verified in further studies.

*Screening of those under high levels of stress and interviews with physicians.* No available study investigated the effect of interviews with physicians for those under high levels of stress following a stress check. There are few studies worldwide that have shown the

effectiveness of screening for mental disorders such as depression following stress checks. Wang *et al.* (2007) reported that intensive care by trained social workers and experts following screening was effective (Wang *et al.*, 2007). Considering the low implementation rates of interviews with physicians in the Stress Check Program in Japan, interviews with physicians are unlikely to be effective in the present system that targets those under high levels of stress.

It is difficult to demonstrate the effectiveness of the secondary preventative functions of the Stress Check Program within current mandatory frameworks, but measures for managing those under high levels of stress at risk for mental health-related sick leave are necessary. The studies we reviewed recommended tools such as, self-care using existing points of contact with workers, preliminary interviews with public health nurses (Masuzawa *et al.*, 2018), frameworks for ex-post actions that could be passed onto experts and the creation of a simple manual that includes the previous options. In addition, re-examination of procedures for interviews with physicians including requests filed by workers was proposed to create a system where stress-related consultation was easy for workers.

Interviews with workers and self-care training related to the Stress Check Program (Shintani *et al.*, 2018) could be designed to fit the capacity of workplaces and occupational health staff within the framework of comprehensive mental health measures. The cost of measures for workplace stress is also being examined, which can be used as a further reference in reviewing the system (Yoshimura *et al.*, 2013).

*Reducing psychological stress responses through improvement of the work environment based on group analysis (including education for management and supervisors).* A combination of a stress checks and improvements in the work environment may reduce workers' psychological stress responses (Imamura *et al.*, 2018). As the Stress Check Program started, no study has verified the effect of the program on workers' mental health by using group analysis of stress check results. However, some studies verified the effects of improvements in the work environment implemented based on the stress check results using the occupational stress model within a similar framework (Egan *et al.*, 2007; Lamontagne *et al.*, 2005; Montano *et al.*, 2014). The present results are consistent with these reports.

### *What the relevance of the stress check program is as implemented in Japan to other countries*

The Japanese Stress Check Program focuses on prevention of mental health problems by combining an annual stress survey that aims to decrease the risk for mental health problems by increasing workers' awareness of their own stress and allowing group analysis to improve the workplace psychosocial environment. The major strategy for improving worker mental health in European countries is risk assessment and management of psychosocial factors at work (e.g. Psychosocial Risk Management Excellence Framework: PRIMA-EF) (International Labour Organization, 2012; Leka *et al.*, 2011). This approach focuses on the psychosocial work environment. The ordinal procedure for the psychosocial risk assessment at work is conducted by using an anonymous survey, and the report is summarized based on the group. Compared with national policies and programs to prevent occupational stress conducted in other countries (Brookes *et al.*, 2013; Daniels *et al.*, 2012; Mackay *et al.*, 2004; Malachowski *et al.*, 2017), Japan's program is unique in that individual workers are identified (for screening purposes) and group analysis is not mandatory.

It may reflect a culture of paternalistic approach of Japanese occupational health system, in which employers are expected to protect employees' health and welfare (Kawakami and Tsutsumi, 2016). Such individualized approach could be easily adopted by the countries with similar cultural backgrounds and/or occupational health systems, such as general health examination at workplace (Kang *et al.*, 2017). It is also interesting to see the effects of the Stress Check System in the countries sharing common occupational health issues (Tsutsumi, 2019).

However, the effect of the program needs to wait for the future evaluation on the longer-term impact of the program.

## Conclusions

The aim of the 13th Occupational Safety and Health Program (2018–2022) (Japan Ministry of Health, Labour and Welfare) is to increase the proportion of workplaces that perform group analysis using the results of stress checks and utilize the results to 60% or higher (Ministry of Health, Labourand Welfare, Japan, 2018). The results of group analysis can be used at various levels, such as comparisons of overall enterprises with the national average, comparisons between departments and improvements in the work environment based on the results. As discussed earlier, implementation of improvements in the work environment as part of the Stress Check Program was observed in a number of workplaces; however, few workplaces had made improvements based on stress check results. Improvements in the work environment that are linked with the Stress Check Program need to be further promoted. Further efforts are needed to narrow the gap between evidence and implementation, including improving guidance manuals and introducing different methods based on successful cases to increase the on-site implementation potential of the Stress Check Program.

The Japanese Stress Check Program contrasts with risk management of psychosocial factors at work as a strategy for improving workers' mental health proposed by international bodies such as the World Health Organization and the International Labor Organization. These strategies target the psychosocial work environment rather than psychosocial stress among individual workers. Although the effectiveness of the Japanese program needs further evaluation, future developments of the program would provide insight for national policies on psychosocial risks/psychosocial stress at work.

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