

うになっている (<http://osakas.johas.go.jp/kokoro/>) (図1)。

職場復帰(リワーク)支援に取り組んでいる医療機関は19.5%で、将来的に取り組もうと考えている医療機関も17.7%あった。産業医資格を有する医師、看護師、臨床心理士、精神保健福祉士の有資格者はそれぞれ、48.4%、63.7%、46.5%、34%であり、産業医資格を有する医師および心理の専門家(臨床心理士・精神保健福祉士)が勤務している医療機関では、職場のメンタルヘルス相談や職場復帰支援(リワーク支援)の導入が進んでいる傾向があった。とくにクリニック開設者が産業医資格を有することによって産業保健活動への理解が促進されること、職場復帰支援(リワーク支援)プログラムの提供が地域において充足するには、将来的に精神科専門医療機関の心理の専門家や他の医療従事者も職場環境への理解が求められることが推察された。

## 2. 「大阪版事業場のメンタルヘルスこころの健康専門家ガイド」試用についての調査

大阪産業保健総合支援センターは、大阪府下の事業場を対象として実施している情報提供が効果的であるかどうかを検証するために、大阪府下の1,249件の事業場を対象に郵送調査を行い、369件から回答を得た<sup>10)</sup>。

「大阪版事業場のメンタルヘルスこころの健康専門家ガイド」を利用している事業場は33件(8.9%)で多くはなかったが、利用経験のある事業場はリワーク支援に取り組んでいる職場が多いことが示された。また、企業規模が小さいと利用されない傾向があった。さらに、49.3%の事業場が、従業員の健康上の問題や、希死念慮のある場合等、家族との連絡を取る必要性を感じたことがあると報告し、30.4%の事業場が、本人からの同意が得られない、個人情報保護の観点等から家族との連絡に躊躇すると報告していた。

図1 『大阪版事業場のメンタルヘルスこころの健康専門家ガイド』のトップページ



### ——— こころの健康専門家との連携について ———

事業場において、産業保健スタッフや人事・労務担当者として、外部医療機関との連携が求められる場合があります。仕事や日常生活への支障が大きく医療機関の受診が必要な場合、従業員の方が治療を受けながら就労を継続される場合、退職された後の復職時期などです。

掲載されている情報を参考に、貴事業場のメンタルヘルスの推進にお役立ていただければと思っています。

**条件から検索する**

キーワード

住所

診療曜日 ☐月 ☐火 ☐水 ☐木 ☐金  
☐土 ☐日 ☐祝

予約 ☐要 ☐不要

疾病 ☐うつ病 ☐気分障害  
☐統合失調症 ☐神経症  
☐てんかん ☐アルコール関連  
☐認知症 ☐適応障害  
☐思春期 ☐パニック障害  
☐発達障害 ☐不眠症  
☐心身症



「大阪版事業場のメンタルヘルスこころの健康専門家ガイド」の利用経験がない336事業場を対象に、ガイドの試用を求めた再調査が行われ、回答が得られた214件のうち、「大阪版事業場のメンタルヘルスこころの健康専門家ガイド」試用の有無が判明した208件が解析されている。家族との連携をとる必要性があった事業場、教育研修を実施している事業場、職場復帰について業務上の配慮をしている事業場、保健師の存在する事業場で「大阪版事業場のメンタルヘルスこころの健康専門家ガイド」が多く試用されていた。とくに保健師の存在は統計学的にも有意に（オッズ比2.3）試用の有無と関係していた。逆に、相談窓口と管理監督者との連携が明確でない事業場では統計学的に有意に試用されていなかった。家族との連携の必要があったという要因は、その事業場でニーズがあったということでも解釈可能だが、ツールを効果的に利用するためには、保健師等の専門職の存在、およびメンタルヘルス対策への役割分担の明確化が小規模事業所では必要である可能性が示唆された<sup>10)</sup>。

### Ⅲ 職域と地域の連携ギャップ削減のための医師会と嘱託産業医の取り組み

地区医師会の嘱託産業医は、小規模事業場を含む地域の産業保健の主要な担い手である。京都府医師会では、一般内科医が多い嘱託産業医向けに実地研修を含むメンタルヘルス関連の産業医研修を提供し、資質向上に努めている。また京都では、産業精神保健に造詣の深い医師（故島悟先生：当時京都文教大学）の発案に賛同した京都府下の精神科医、産業医が世話人となり発足した産業医と地域の精神科医による合同の定例研究会を開催し、相互理解および連携の強化に取り組んでいる。

#### 1. 京都府における多職種連携向上の取り組み

##### 1) 産業医と精神科医との連携構築の取り組み

嘱託産業医と精神科医による京都産業精神保健ネットワーク研究会が、2007年より年1回開催されている。事例検討を通じて、相互理解が深まり、産業保健におけるメンタルヘルス活動の円滑な推進に寄与しており、嘱託産業医と精神科医の「顔の見える関係づくり」に役立っている。今後、就業措置内容の報告など密な連携へ発展させることが企図されている。

##### 2) 京都復職支援ネットワーク会議の開催

メンタルヘルス不調者の職場復帰支援などにおける、精神科医、産業医、人事労務担当者、臨床心理士等の多職種連携の向上を目指して2010年より京都復職支援ネットワーク会議が開催されている。会議

終了後には、茶菓を提供して、ゲストの講師を交えた名刺交換会を行い、ネットワークづくりを行っている。

京都府医師会産業保健委員会は、医師会長からの治療と仕事の両立支援に関する諮問への答申を作成するために開始した、会員嘱託産業医、専属産業医、腫瘍内科医、大学病院 Medical Social Worker (MSW)、産業保健総合支援センター両立支援促進員、当事者兼支援者、社会保険労務士といった多職種の意見交換から相互理解が進みつつある。多職種から産業医への不満や要望などを聴取して改善策を検討中である。

#### 2. 両立支援推進チームによる多職種連携—京都府地域両立支援推進チーム

2018年度より、各都道府県に「両立支援推進チーム」の設置が始まり、京都にも推進チームが設立された。治療と仕事の両立支援を効果的に進めるため、府下の労働局、自治体、関係団体等がネットワークを構築して連携を図り、その取り組みを推進することを目指す協議会であり、京都府医師会を代表して著者の一人（森口）もチームに参加している。京都府、京都市、医師会、京都大学および京都府立医科大学病院、労働基準協会、労働組合、社会保険労務士会、医療社会福祉協議会、産業カウンセラー協会、日本キャリア開発協会、産業保健総合支援センター等、多くの団体が参加し、年一回ずつの会議とセミナーを実施している。推進チームの会議では各団体の取り組みが紹介されるため、これまで関わりが乏しかった団体同士がそれぞれの活動の理解を深めることにより、心身の疾患の両立支援における多職種連携の基礎が構築されつつある。

#### 3. 社会医学系専門医制度

2017年度から社会医学系専門医制度「京都プログラム」の専攻医の受け入れが開始された。「行政・地域」、「産業・環境」、「医療」の三分野のいずれかを主分野とし、副分野についても研修を積むことになっているため、嘱託産業医のなかで専門医を志向する医師が行政や地域の会議見学などを経験し、地域保健等他分野の知識を深める機会となっている。

### Ⅳ 社会保険労務士・精神保健福祉士による企業のメンタルヘルス対策と地域連携モデル

メンタルヘルスの課題に関する相談先として利用される社外の専門機関・専門家には、労働衛生機関や社会保険労務士があるが、小規模な事業場ほど社会保険労務士に相談することが多い<sup>11,12)</sup>。中小企業では内部の人材だけで対応が困難なため、外部の専



門機関を積極的に活用できると対策の幅が広がる。

そこで、社会保険労務士として有する企業のネットワークを、障害者雇用を活用している事例を紹介した。著者の一人（背尾）が代表を務める社会保険労務士事務所では、就労移行支援事業所と連携して、有病者、障害者のインターンの受け入れを行っている。連携先には、うつ病など気分障害の方の職場復帰（リワーク）支援や再就職支援（就労移行）サービスを行っている事業所、発達障害の就労移行支援を行っている事業所がある。現在、障害のある方が業務委託という形で関わっている事例は2件あり、外線電話対応と会計ソフトへの入力業務を行っている。電話対応は週2回、会計ソフト入力は月1～2回で実績を挙げている。その他、障害のある方が通う学校（1校）に対して作業を発注するなど、少しずつ活動の広がりが見られている。

障害者雇用における新たな取り組みとして、長屋プロジェクトと銘打ったプロジェクトが発足している。長屋プロジェクトとは、企業の1件1件を家として、相互協力する「長屋」をイメージした企業間の相互支援型の業務委託・インターンシステムで、2017年から取り組みが開始された。この中には、テレワーク事業のコンサルタントの支援を受け、遠隔で就労継続支援B型事業所を運営しているNPO法人等の障害者へ業務を委託する形で関与先を増やす取り組みや、同様に、障害者である社員のシェアを活用する試みもある。必ずしもフルタイムの雇用形態にこだわっていないことは特記すべきことと思わ

れる。最近では、信用金庫を地域の中核として、複数の事業所での連携を始めている。障害者雇用という切り口ではあるが、企業のメンタルヘルス対策に役立つ新しい連携モデルにもつながる取り組みである。

## V 中小事業場を対象とした地域・職域連携推進連絡会による連携の実践

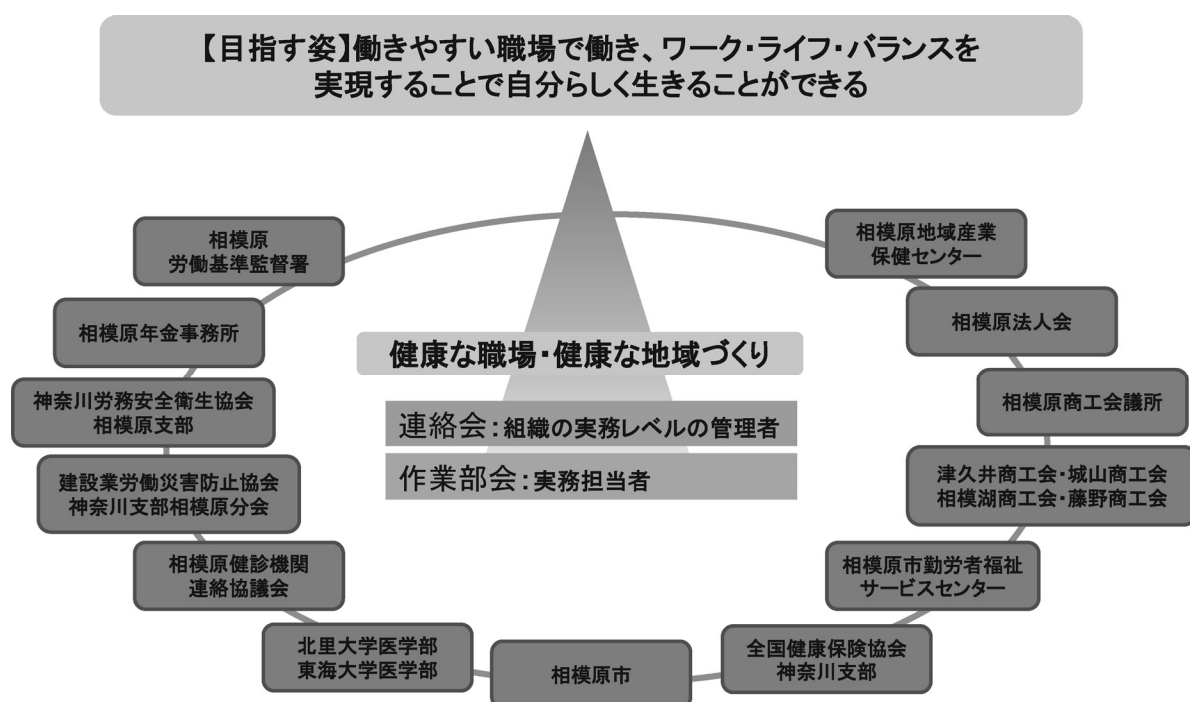
### 1. 相模原市の地域・職域連携の体制・事業内容

相模原市においては50人未満の小規模事業所が約97%を占める。中小事業所を対象とした実態調査において、小規模事業所のメンタルヘルス対策を含む健康づくりが課題となっている。市の地域・職域連携推進連絡会（以下「連絡会」という）において、中小事業所のメンタルヘルス対策を含めた健康づくりの推進を目的に、事業所を訪問し、健康経営グッドプラクティスを収集して、他の中小事業所の事業主へ周知する取り組みを行っている。

連絡会は地域と職域の実務レベルの管理者で構成されており、下部組織として市職員9人、関係機関10人の実務担当者で構成する作業部会を設置している。事務局は4人である（図2）。連絡会と作業部会において働く人の目指す姿を実現するために様々な取り組みを行っている。

相模原市は、2007年に「職域保健との連携」を市保健医療計画において重点課題として設定した。2008年に連絡会と作業部会を設置した。働く人の目指す姿（ビジョン）を共有した上で、評価指標を設

図2 働く人の健康づくり地域・職域連携推進連絡会



定した。事業主と従業員を対象として5年ごとに、健康づくり基盤整備に係る実態調査を実施している。実態調査で取り組みの進捗状況を評価し、事業計画を改定している。さらに5年間の事業計画に沿って、毎年度の事業計画を作成して取り組みを実施、評価をしている。そのために実施している事業主を対象とした調査は、徐々にではあるが、回収数が増加している。

これまでの実態調査で、事業場のメンタルヘルス対策の取り組みは進んでいるが、小規模ほど課題があることが分かっている（たとえば、50人未満だとストレスチェックの実施や不調者への対応が十分でないことなどを数値化している）。現状把握を基に、働く人の課題として、健康づくりに取り組む事業主を増やすための取り組みの必要性、働き世代への健康づくりに関する普及啓発の必要性、小規模事業所の健康づくりを推進するための取り組みの必要性の3つが挙げられた。「職場全体で健康づくりに取り組む必要があると思う事業主を増やす」「健康づくりに取り組んでいない事業所を減らす」「自分や家庭生活のための時間の確保ができていない従業員を増やす」などを、ビジョンを達成するための主な指標として設定して活動を行い、健康づくりに取り組む事業主・事業所における指標の改善を認めている。

連絡会が行っている3つの事業には、事業主が集まる場で職場の健康づくりや健康経営について普及啓発を行う「健康づくり懇談会」、企業からの依頼や連絡会構成機関が主催する労働大会や衛生大会等のイベントに出向く「働く人が集まる場所での普及

啓発事業」、主に小規模事業所をターゲットとして実施する「中小事業所訪問・健康経営支援」が含まれる。2018年度から出張健康事業の仕組みを整備した結果、働く人が集まる場所での普及啓発事業の回数（2017年度13回から2018年度の45回）、参加人数（2017年度の1,207人から2018年度の3,057人）ともに増えている。

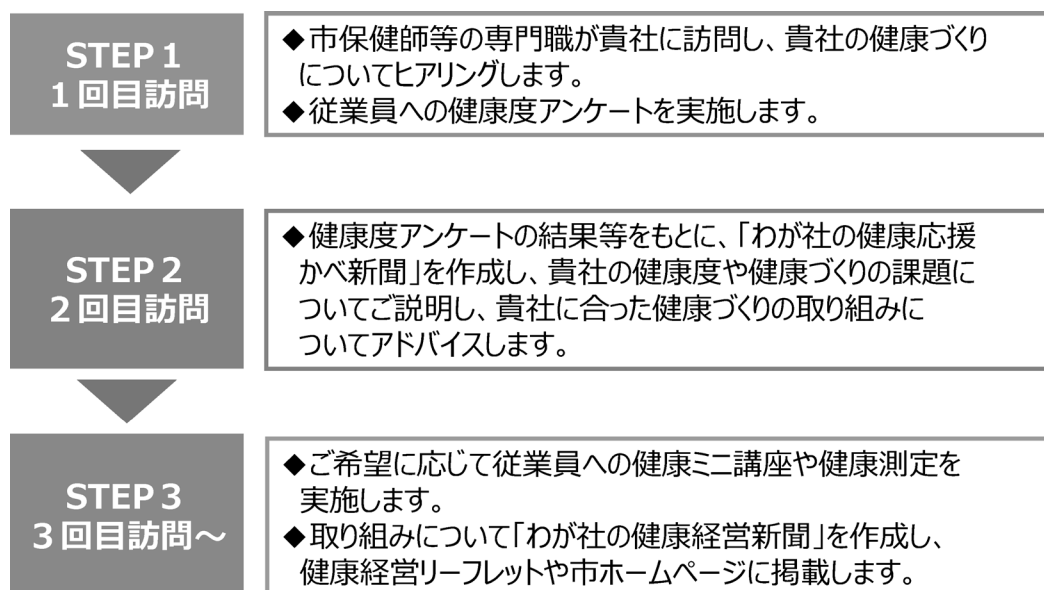
## 2. 中小事業所の訪問について

中小事業所を訪問し、事業所の健康経営に資する支援を行い、事業所訪問で得られた健康経営グッドプラクティスを多様な方法で周知している。これらの取り組みにより、健康経営の普及啓発と健康経営に取り組む事業所の増加を目指している。

作業部会でグループを作って、2016～2018年度に23か所の中小事業所を訪問した。事業主からは、健康診断の実施やメンタルヘルスの取り組み状況などざっくばらんに聞いている。従業員に生活習慣アンケートを記入してもらい、それを集計し事業所の健康状況や好ましい点および課題等を「健康応援かべ新聞」にまとめ、再度訪問して結果を説明し、事業所のニーズにあった健康づくりの取り組みについてアドバイスしている（出張健康教室）。最終的には事業所の健康経営のグッドプラクティスをまとめ、リーフレットを作成するとともに市のホームページにアップしたり、連絡会の構成機関を通じて配布するなどしたりして、幅広く周知している（図3）。

中小企業訪問のメリットとして、地域保健の立場からは、今まで出会うことのできなかった地域の働き盛り層にアプローチでき、実態の把握や普及活動ができる貴重な機会と捉えている。実態調査の結果

図3 中小事業所訪問の流れ（実際の案内から）



は、普及啓発事業のブラッシュアップにも役立てている（PDCAを回している）。小規模事業場のグッドプラクティスの普及啓発を通じて、口コミ等による他事業場への波及効果を期待している。

小規模事業所の立場からは、従業員アンケートの結果から事業所の健康づくりの課題が明確化される。事業所の課題に応じた取組を、事業主と従業員で話し合い検討することで、職場の健康づくりの意識が高まる（従業員参加型の職場環境改善）。事業主の話から困っていることなども聞き取ることができるので、事業所のニーズにあった支援が受けられる。地域の専門的な相談機関や資源を知ることができると評価されている。健康経営リーフレットなどによる周知により健康経営に取り組んでいる事業所として、PRにもつながる。

連絡会の立場からは、メンバーによる中小事業所訪問は、健康経営に取り組んでいる事業主の意識や従業員の生活習慣を把握でき、出張健康教室の取り組みや多種多様な事業所のグッドプラクティスの収集につなげることができている。とくに健康経営グッドプラクティスを紹介するリーフレットは、他の中小事業主への健康経営の意識向上につながるツールとなっており、市全体への健康経営の普及啓発の推進に向けて、取り組みを継続する予定である。メンタルヘルスや両立支援の事例についても、連絡会の構成機関のみならず、そのネットワークを通して地元企業から相談が挙がるようになり、地域産業保健支援センターなどの必要なサービスにつなげられた事例も見られるようになっている。

## Ⅵ 連携の課題と実効性のある連携方法について

前述のように、いくつかの好事例を報告したが（表1）、同時に、連携に係る課題も明らかになった。シンポジウムでのディスカッションで出されたフロアの意見も入れて、以下の項で考察を行いたい。

### 1. 地域・職域連携のピットホール

大阪産業保健総合支援センターが行った調査では、家族への連絡を取る必要性を感じる事態を経験した事業場が約半数あったが、個人情報保護、本人と家族の関係性、家族の心身の状況等が懸念され、連絡を躊躇する場合があることが示された（家族との関係が悪く、連絡を取ると自殺されたケースがある）<sup>13)</sup>。家族への支援・連絡、訪問支援等、事業場が対応に限界を感じるようなケースに対し、職場から、もしくは、産業保健総合支援センターから、家族もしくは地域保健とどのような連携が取り組めるのが課題として認識されている<sup>14)</sup>。

表1 メンタルヘルス対策：職域と地域の連携向上に役立っている好事例

- リワークなど、職場のメンタルヘルスに関わるサービスを提供している地域の医療機関についての情報を集約し、発信している産業保健総合支援センターの活動
- 地域の産業保健の主要な担い手である地区医師会の嘱託産業医と地域の精神科医等、関係者による合同勉強会の開催、社会医学系専攻医の副分野研修の充実
- 障害者雇用のネットワークづくりから発展した企業間の連携によるインターン受け入れ活動
- 食事、運動、健診、アルコール対策など、通常の保健活動の中に、メンタルヘルス対策を取り込んだ行政による出張事業の展開
- 地域・職域連携推進連絡会を構成し、中小事業場に訪問し、壁新聞等を利用した事業所の健康経営における課題の見える化、事業所のニーズに合わせた出張健康教室等の実施、事業所の健康経営グッドプラクティスを紹介するリーフレットの作成

事業場側からの連絡と同様、嘱託産業医業務の中で、地域保健の資源とより密接に連携していれば異なる経過をたどったのではないかと反省する事例が経験されている。休職中のメンタルヘルス不調者から傷病手当金申請書が提出されなくなった際、休職中の労働者に人事労務担当者や産業保健スタッフが深く関わることはないため、別居の家族に訪問要請するも高齢のため速やかに対応できず病状がさらに悪化したもので、会社スタッフが関与することが少なくなる休職中に、健康支援の枠組みから漏れてしまうピットホールが示された事例であった。

### 2. 地域の活動における課題

相模原市の活動では、事業所訪問は作業部会の事務局が中心となって実施しているマンパワーの確保が課題となっている。グループでの訪問は年間5事業所程度で、依頼があった際に随時対応するという状況になっている。出張健康事業など必要な支援を実施し、グッドプラクティスを収集するためにも、多くの事業所に訪問したいが難しく、事業所訪問の後のフォローアップは実施できていない。

出張健康事業の実施にあたっては、職場のメンタルヘルス対策等、労働安全衛生法に係る内容については地域保健としては専門分野ではないため、依頼があった際に十分な対応ができていない。産業保健分野を得意とする他機関とも連携して実施するなどの対応案が検討されている。

労働者の支援を行政につなぐことが難しいという課題には、行政の場合、当該自治体に「在勤」では



なく「在住」する人が主な対象となることや、本人の同意なしに行政に相談がある事例など行政の支援の限界が言及された。前者については、精神保健福祉センター等紹介先のリストアップすることや、関連して、連携の窓口やサービス内容を取りまとめて、行政単位よりも広域で情報を発信できないか検討している。

### 3. 職域と地域の連携のギャップを埋めるために

産業看護職・保健師は従業員本人からの情報を収集し、産業医や職場の関係者との調整を行う役割を担っており<sup>15)</sup>、連携促進のキー職種になると思われる。労働者およびその家族との調整とともに、相談窓口など体制づくりの助言や外部専門家の活用方法など、事業場向け教育にも貢献しうる。保健師に向けた情報提供は有用な手段となると思われ、効果的な情報提供方法を検討する必要がある。一方で、産業看護職・保健師を含めた専門職が在籍できない事業場でも活用できるツールを作成する必要がある。

全国47の都道府県に設置されている産業保健総合支援センターは、産業医、産業看護職、衛生管理者等の産業保健関係者を支援するとともに、事業主等に対し職場の健康管理への啓発を行うことを目的として、独立行政法人労働者健康安全機構が設置している組織である。また、産業保健総合支援センターは、労働者数50人未満の小規模事業場の事業者や労働者に対して支援を行う地域窓口（全国に350ある「地域産業保健センター」）の運営を担っている。どちらのセンターも、地域の医師会との緊密な協力の下で活動を行っており、地域職域連携において中核的な機能が期待される。

大阪産業保健総合支援センターの調査結果から類推されるように、主治医が産業保健のことをよく知っていることは、連携を進める。京都府に見られるような、臨床医と産業保健職が一緒になった勉強会は、有用な機会になると思われる。京都府では、医師会や行政が、労働者のメンタルヘルスに関わる関係者による定期的な会合や研究会を開催しており「顔の見える関係」の構築に努めていた。同様の事例は、産業看護職主体の活動にも見られる。日本産業衛生学会登録の産業看護職への調査によると、地域保健との連携が必要とする者は81%であったが、地域保健との連携の経験があったのは34%であった。連携の経験あった群は、40歳以上で経験豊富な保健師で、地域保健主催の研修会に参加し、職場の先輩から助言を受けていたと回答していた。これを受け、2018年から平塚保健福祉事務所で、1回/1～2か月の地域保健・職域保健関係者（保健師）の勉強会が開始されており、顔の見える関係づくりに寄

与している<sup>16)</sup>。

相模原市では、評価指標を数値化（KPI）し、PDCAを回している。出張健康事業のメニューは、必ずしもメンタルヘルスに特化せず、健康課題全般を扱っている。すなわち、食事、運動、歯の健康、健診・がん検診および健康測定等、一般的な健康問題に、休養・睡眠を加え、労働者の関心を引くようなテーマを見せ、事業場の興味のあるメニューを選ばせてデータをまとめている。地域で職場のメンタルヘルスを扱う場合、包括的な産業保健サービス提供の中でメンタルヘルス対策を提供していく方向性は、受け入れられやすく、活動を広げやすいと考えられた。

行政サイドからは、なるべく職場に出向き、職域で取り組める活動を聞き取ることが有用という意見があった。労働者のメンタルヘルス対策を小規模の事業場で展開するためには、通常の保健活動の中にメンタルヘルス対策を組み入れていくのがもっとも受け入れられやすいようである。岡山市職域依存症対策推進モデル事業<sup>17)</sup>では、働き盛りの時期に習慣飲酒に介入し、依存症への進展を予防することを目的とした事業で、アルコール専門医による初期介入プログラムを、希望する事業場へ無料で出前講義している。専門医2人、こころの健康センター保健師2人が関与しており、地域と職域の保健師間の情報交換が行われ、両領域のシームレスな健康支援の好例と思われた（表2）。

## VII 結 語

労働者のメンタルヘルス支援については、地域、職域両者から連携のニーズがある。今回、産業保健総合支援センター、医師会の産業医部会、社会保険労務士、保健所（政令市）が主体的に行っている活動を紹介し、それぞれの課題を提示した。職域と地

表2 メンタルヘルス対策：職域と地域の連携のギャップを埋めるためのヒント

- 主治医が産業保健のことをよく知っていることは、連携を進める。臨床医と産業保健職が一緒になった勉強会は、有用な機会になる。
- 産業看護職・保健師は、メンタルヘルス不調の労働者と管理監督者を連携するキーパーソンになる。事業場には、メンタルヘルス対策の体制を整えるような啓発も行っている（外部のリソースの活用など、必要な情報が有効活用されるようになる）。
- 行政側からは、関係機関の連絡会をベースに、地域の小規模事業場にアプローチする。その際、通常の保健活動の中にメンタルヘルス対策を組み入れていく。

域の連携のギャップを埋めるためには、保健師や臨床医を含む多職種での連携が必要ということが共通の認識であったが、多職種で連携することのコツとしては、単に事業をやれば良いわけではなく「目指す姿」をイメージして共有することが大切だという意見が出され、傾聴に値するものと思われた。

本稿は、第78回日本公衆衛生学会総会（高知）において、日本公衆衛生学会メンタルヘルス・自殺対策委員会によって企画された公募シンポジウム「メンタルヘルス対策：職域と地域の連携のギャップを埋めるために」を基に執筆された。一部は、令和2年度労災疾病臨床研究事業（200401）「小規模零細事業場の構成員に必要な支援を効率的に提供するツールと仕組みを通してメンタルヘルス対策を浸透させることを目指す実装研究」の補助を受けて執筆された。本稿の執筆に当たり申告すべき利益相反はない。

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# Association Between Adaptation of Management Philosophy and Mission Statement, and Work Engagement Among Japanese Workers

## *A 1-year Prospective Cohort Study in a Japanese Company*

Hisashi Eguchi, MD, MBA, PhD, Akiomi Inoue, PhD, Yuko Kachi, PhD, and Akizumi Tsutsumi, MD

**Objective:** To investigate the association between individual adaptation of management philosophy and mission statement, and work engagement among employees in a single Japanese company. **Methods:** We carried out a 1-year prospective cohort study on all workers aged 18 to 65 years in a Japanese electrical components manufacturer. Our cohort included 2044 men and 721 women. We used multiple regression analysis to examine associations between variables. **Results:** Higher individual adaptation of management philosophy and mission statement at baseline was significantly associated with better work engagement at follow-up after adjusting for potential confounders and work engagement at baseline ( $\beta = 0.085$ , 95% confidence interval 0.054 to 0.117). **Conclusions:** There is a positive association between higher individual adaptation of management philosophy and mission statement with work engagement.

**Keywords:** cohort study, corporate values, Japan, mission statement, work engagement

Management philosophy and mission statement are the central, distinctive, and enduring concepts, beliefs, principles, and attitudes guiding business management, which are critical in the pursuit of an organizational mission.<sup>1</sup> Articulating and delivering on the management philosophy and mission statement may help to transform commitment into productive effort, because these elements may provide direction for individuals, set constraints on employee behavior, and enhance individual motivation by providing

a clear picture of the organizational goals, norms, and values.<sup>2</sup> A previous study found that individual adaptation of management philosophy and mission statement affected individual attitudinal and behavioral outcomes in the workplace, such as job involvement and organizational citizenship behavior.<sup>3</sup>

Over the past several decades, focus in research on workplace psychosocial factors has shifted from negative aspects, such as burnout and psychological distress, to positive aspects of work.<sup>4</sup> These include work engagement, which is defined as “a positive, fulfilling, work-related state of mind characterized by vigor, dedication, and absorption.”<sup>5</sup> The positive effects of work engagement on mental and physical health have been extensively reported.<sup>6–8</sup>

The Job Demands–Resources (JD-R) Model is one of the most frequently used models to explain work engagement.<sup>9–11</sup> Job resources are physical, social, or organizational aspects of the job that may: (a) reduce job demands and the associated physiological and psychological costs; (b) help to achieve work goals; or (c) stimulate personal growth, learning, and development.<sup>10</sup> Individual adaptation of management philosophy and mission statement may be a job resource, because it has been found to promote behaviors that help others and the organization.<sup>3</sup>

Self-determination theory may offer a useful perspective regarding the underlying mechanisms explaining how individual adaptation of the management philosophy and mission statement leads to higher levels of work engagement.<sup>12</sup> At the core of self-determination theory lies the assumption that human beings are active social agents that take in life experiences in social contexts and integrate these with their sense of self, thus creating meaning and developing a more unified sense of self-identity.<sup>12</sup> Based on self-determination theory, a previous study reported that corporate purpose was positively associated with work engagement.<sup>13</sup> In addition, the organization’s mission and vision statement affected the broader or higher corporate purpose.<sup>13</sup> Therefore, we hypothesized that the individual adaptation of management philosophy and mission statement would be associated with work engagement. To the best of our knowledge, no previous studies have examined this association.

In the current study, we sought to investigate the prospective associations between individual adaptation of management philosophy and mission statement, and work engagement in a cohort of Japanese workers in a company, comparing results by sex. We hypothesized that higher levels of individual adaptation of management philosophy and mission statement at baseline would be associated with higher work engagement levels at follow-up.

## MATERIALS AND METHODS

### Study Design and Population

We carried out a 1-year prospective cohort study among all workers aged 18 to 65 years ( $n = 3593$ ) at two manufacturing sites operated by an electrical components company in the Kinki region in Japan (Fig. 1). All staff employed at the two sites were invited to

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The study aims and protocol were reviewed by the Research Ethics Committee of the Graduate School of Medicine and Faculty of Medicine, The University of Tokyo (No. 2772-[4]), Kitasato University Medical Ethics Organization (No. B12-103), and the Ethics Committee of Medical Research, University of Occupational and Environmental Health, Japan (No. 10-004). Workers were informed before completing the baseline questionnaire that participation was strictly voluntary and that all information provided would remain confidential. Written informed consent was obtained from all participants.

The authors report no conflicts of interest.

**Clinical significance:** Different companies have different management philosophies and mission statements, reflecting differing value orientations. Greater individual adaptation of management philosophy may be associated with increased work engagement. Individual adaptation of management philosophy and mission statement may therefore be considered a job resource.

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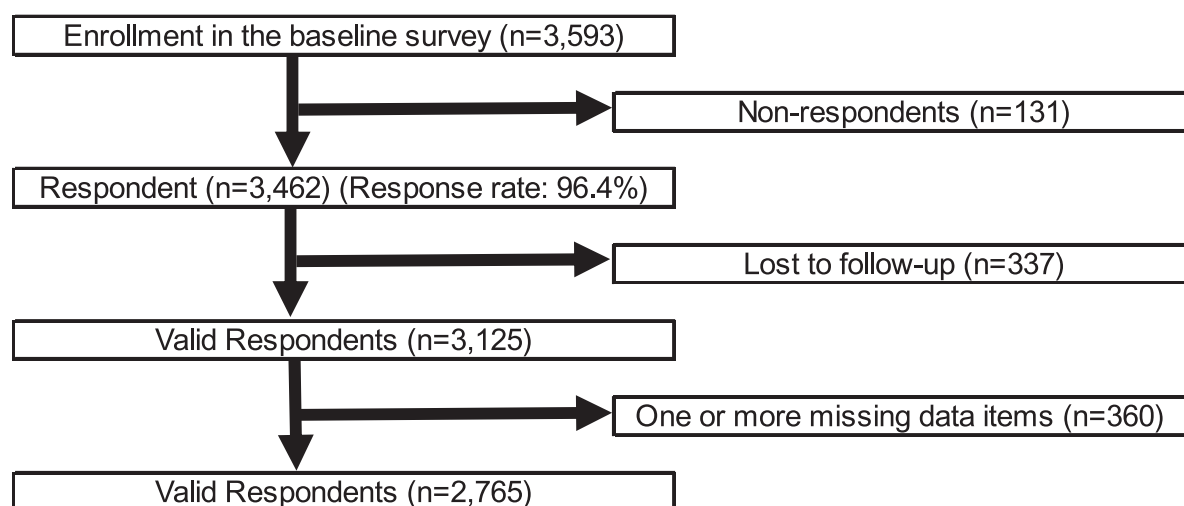


FIGURE 1. Flow of participants of the study sample ( $n = 2765$ ).

participate in a baseline survey, which ran from April to June 2011. Data were collected using a self-administered questionnaire that included measures of adaptation of management philosophy and mission statement, work engagement, and other individual-level characteristics. At baseline, a total of 3462 questionnaires were returned in sealed envelopes, and 131 employees did not agree to participate in this study (response rate: 96.4%). The mean values of the age and sex ratios of participants in our study were almost the same as for the working population of the two manufacturing worksites. During the 1-year follow-up period, 337 employees were transferred, took a leave of absence (ie, sick leave, maternity leave, or childcare leave), retired, or declined to participate. There were no significant differences between baseline and follow-up groups on measures of individual adaptation of management philosophy and mission statement, work engagement, or other covariates such as sex, age, educational level, weekly working hours, and prevalence of chronic diseases. However, the proportion of the group aged  $\leq 29$  and  $\geq 50$  years was higher among workers lost to follow-up compared with the baseline group. The proportions of professionals, technicians, clerks, and service workers were also higher, and the proportion of manual workers was lower, among those lost to follow-up. We excluded employees who had at least one missing data item ( $n = 360$ ). Therefore, we analyzed data from 2765 workers. Before completing the baseline questionnaire, workers were informed that participation was strictly voluntary and that all information provided would remain confidential. Written informed consent was obtained from all participants. The study aims and the protocol were reviewed by the Research Ethics Review Committee of the Graduate School of Medicine/Faculty of Medicine at the University of Tokyo (No. 2772), Kitasato University School of Medicine/Hospital (B12-103), and University of Occupational and Environmental Health, Japan (10-004).

### Measurement of Work Engagement

We used the nine-item Japanese version of the Utrecht Work Engagement Scale (UWES-9)<sup>14,15</sup> to assess work engagement at baseline and follow-up. The UWES-9 includes measures of vigor (three items), dedication (three items), and absorption (three items) on a seven-point response scale from 0 (never) to 6 (always/every day). Overall scores for the UWES-9 (range 0 to 6) were calculated by averaging individual item scores. The UWES-9 was translated into Japanese with acceptable internal consistency and reliability, and factor and construct validity.<sup>15</sup> Cronbach's  $\alpha$

coefficient for the total score was 0.93 at baseline and 0.94 at follow-up.

### Measurement of Individual Adaptation of Management Philosophy and Mission Statement

The individual adaptation of management philosophy and mission statement at baseline was assessed using three questions derived from the previous studies.<sup>3,16</sup> The original questionnaire to assess the individual adaptation of management philosophy and mission statement was composed of 11 items in three categories: emotional empathy for the management philosophy (three items), cognitive understanding of the content of the management philosophy (three items), and behavioral engagement that reflects the management philosophy (five items).<sup>17</sup> To create a parsimonious questionnaire to conduct the study in the workplace, an item from each category was chosen, as follows: "My company's management philosophy fits my sense of values" (emotional empathy for the management philosophy), "I understand my company's management philosophy" (cognitive understanding of the content of the management philosophy), and "My company's management philosophy has a strong effect on my attitudes towards my work" (behavioral engagement that reflects the management philosophy). Responses were measured on a 5-point scale (1 = completely disagree to 5 = completely agree). Item scores were summed, and greater scores indicated greater penetration of the management philosophy. In our study sample, Cronbach's  $\alpha$  coefficient was 0.86 for the individual adaptation of management philosophy and mission statement scale.

### Measurement of Covariates

Covariates were measured using a self-administered questionnaire, and included demographic factors such as sex, age, educational attainment, occupation, weekly working hours, and annual familial income. Age was expressed as a continuous variable. Educational attainment was classified into five categories: junior high school, high school, technical college or junior college, university, and graduate school. We grouped occupations using the International Standard Classification of Occupation, which is based on skill level and specialization.<sup>18</sup> Participants chose one of nine options: (i) managers; (ii) professionals; (iii) technicians and associate professionals; (iv) clerical support workers; (v) service and sales workers; (vi) craft and related trade workers; (vii) plant and machine operators, and assemblers; (viii) armed forces occupations; and (ix) others. Responses

**TABLE 1.** Demographic Characteristics, Management Philosophy, and Work Engagement Among Employees Who Participated in the Study ( $n = 2765$ )

	Mean	SD	<i>n</i>	(%)
Age, yrs	39.1	10.9		
Educational attainment				
Junior high school			45	(1.6)
High school			1620	(58.6)
Junior college/technical school			514	(18.6)
University			354	(12.8)
Graduate school			232	(8.4)
Occupation				
Managerial			253	(9.2)
Non-manual workers			758	(27.4)
Manual workers			1307	(47.3)
Other			447	(16.2)
Weekly working hours				
30 hours or less			593	(21.5)
From 31 to 40 hours			624	(22.6)
From 41 to 50 hours			957	(34.6)
From 51 to 60 hours			450	(16.3)
More than 61 hours			141	(5.1)
Yearly familial income				
<3 million yen			361	(13.1)
3–5 million yen			682	(24.7)
5–8 million yen			1120	(40.5)
8–10 million yen			376	(13.6)
10–15 million yen			205	(7.4)
15 million yen+				
Having chronic disease				
No			2105	(76.1)
Yes			660	(23.9)
Penetration of management philosophy (3–15)	11.1	2.0		
Work engagement at baseline (0–6)	3.0	0.9		
Work engagement at follow-up (0–6)	2.9	1.0		

were classified into four categories: managerial workers (managers), non-manual workers (professionals, technicians and associate professionals, clerical support workers, and service and sales workers), manual workers (craft and related trade workers, plant and machine operators and assemblers, and armed forces occupations), and other (others). Weekly working hours were categorized as: 30 hours or less, from 31 to 40 hours, from 41 to 50 hours, from 51 to 60 hours, and 61 hours and more. Study participants were asked to indicate their yearly familial income from six income bands: (i) less than 3 million JPY (37,500 USD); (ii) 3 to 5 million JPY (37,500 to 62,500 USD); (iii) 5 to 8 million JPY (62,500 to 100,000 USD); (iv) 8 to 10 million JPY (100,000 to 12,500 USD); (v) 10 to 15 million JPY (12,500 to

187,500 USD); and (vi) more than 15 million JPY (187,500 USD). History of or current chronic physical conditions was assessed using a multiple-choice questionnaire with hypertension, diabetes mellitus, hyperlipidemia, and depression as covariates.

### Statistical Analysis

Multiple regression analyses were used to examine the association between the individual adaptation of management philosophy and mission statement at baseline and work engagement at follow-up. We standardized all study variables before inclusion in the analysis. The adjusted standardized coefficients were estimated after first adjusting for sex and age (Model 1), then for educational attainment, occupation, weekly working hours, yearly familial income, and presence of chronic diseases (Model 2), and, finally, for work engagement at baseline (Model 3). All analyses were conducted using STATA V.14.0 (STATA). We defined statistical significance as a two-sided  $P$  value  $< .05$ .

### RESULTS

Participants' characteristics are shown in Table 1.

Table 2 shows that, after adjusting for sex and age (Model 1) and for other demographics (Model 2), individual adaptation of management philosophy was significantly associated with an increase in work engagement at follow-up ( $\beta = 0.388$ , 95% confidence interval [CI] 0.352 to 0.423). This association remained significant after adjusting for work engagement at baseline (Model 3) ( $\beta = 0.085$ , 95% CI 0.054 to 0.117).

### DISCUSSION

In this prospective cohort study with a large sample of workers in a single company, we found that higher individual adaptation of management philosophy and mission statement was a predictor of better work engagement 1 year later. To our knowledge, this is the first study to demonstrate a positive association between individual adaptation of management philosophy and work engagement, after adjusting for potential confounders in an occupational setting.

Our study lends support to the hypothesis that individual adaptation of management philosophy and mission statement is positively associated with work engagement. When individuals adapted the company's management philosophy and mission statement more strongly, they were more involved in the job and engaged in behaviors that helped others and the organization, consistent with previous studies.<sup>3</sup> Individual adaptation of management philosophy and mission statement may therefore be considered a job resource.

Different companies have different management philosophies and mission statements, reflecting differing value orientations. Organizational value can be reflected in organizational culture and implicit, broad goals that guide individuals' behavior at work. Value orientation is the assumed beliefs and thoughts determining the company's fundamental direction.<sup>19,20</sup> A previous study reported that employees' work value orientations (eg, collectivism or individualism) moderated the relationship among

**TABLE 2.** Association Between Penetration of Management Philosophy at Baseline and Work Engagement at 1-year Follow-up ( $n = 2765$ )

	Model 1		Model 2		Model 3	
	Standardized $\beta$	95% CI	Standardized $\beta$	95% CI	Standardized $\beta$	95% CI
Adjusted $R^2$	0.400	(0.365–0.435)	0.388	(0.352–0.423)	0.085	(0.054–0.117)
	0.215		0.220		0.524	

Model 1: Adjusted for sex and age. Model 2: Additionally adjusted for educational attainment, occupation, familial income, and having chronic disease. Model 3: Additionally adjusted for work engagement at baseline.

their perceived corporate social responsibility, organizational pride, and perceived administrative support, together with work engagement.<sup>21</sup> High unit cohesion may be achieved by forcing employees to adapt to the management philosophy and mission statement, but may also be associated with bullying of those who do not “fit” the organizational culture.

Our study’s strengths included its prospective design and high follow-up rate, as well as its focus on individual adaptation of management philosophy and adjustment for relevant potential confounding factors. However, our study also had several potential limitations. First, the study participants were all employed by a single electrical components manufacturing company in Japan. Therefore, the results may not be generalizable to workers in other occupations, countries or settings. Second, we chose one item from each of three categories from a total of 11 items to create a parsimonious questionnaire to conduct the study in the workplace. Future studies should consider replicating the results using the full 11-item scale. Third, further studies are needed to evaluate whether including other confounding factors clarifies the possible mechanisms for the association between the individual adaptation of management philosophy and mission statement, and work engagement. For example, employees’ attitudes toward work–life balance may also play a significant role in the association between individual adaptation of management philosophy and work engagement.

## CONCLUSION

Greater individual adaptation of management philosophy may be associated with increased work engagement.

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# Associations between work-related stressors and QALY in a general working population in Japan: a cross-sectional study

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## Abstract

**Objective** To investigate an association between quality-adjusted life years (QALY) and work-related stressors (job strain, effort/reward imbalance, and poor support from supervisor and coworkers), and estimate loss in QALY caused by these stressors.

**Methods** A cross-sectional study investigated data from a third-wave survey (in December 2017) of a 2-year prospective cohort study of Japanese workers. At baseline (first-wave survey), 5000 participants were recruited from workers who registered with an internet survey company. A total of 2530 participants responded to the second-wave survey 1 year later. Participants were then further recruited to the third-wave survey. An online questionnaire collected information regarding health-related quality of life (measured by EQ-5D-5L), job strain, supervisor and coworker support (Brief Job Stress Questionnaire), effort/reward imbalance (Effort/reward Imbalance Questionnaire), and demographic variables (age, sex, education, occupation, work contract, smoking, and alcohol drinking). Multiple linear regression analysis of the QALY score calculated from responses to EQ-5D-5L was employed on standardized scores of the work-related stressors and adjusted for demographic variables (SPSS version 26).

**Results** Data of 1986 participants were analyzed. Job strain (unstandardized coefficient,  $b = -0.013$ ,  $p < 0.01$ ) and effort/reward imbalance ( $b = -0.011$ ,  $p < 0.01$ ) and coworker support ( $b = 0.017$ ,  $p < 0.01$ ) were significantly associated with QALY score in the fully adjusted model.

**Conclusion** Job strain, effort/reward imbalance, and poor coworker support may be associated with a reduced QALY score among workers. A substantial impairment in QALY associated with the work-related stressors indicates that workplace interventions targeting work-related stressors may be cost-effective.

**Keywords** Quality-adjusted life years · Health-related quality of life · Demand–control–support model · Effort–reward imbalance model · General working population

## Introduction

Health-related quality of life (HRQoL) is a global benchmark for measuring how disability caused by health problems perceptually affects the life of a person or population across disorders and covers health domains ranging from negatively valued aspects of life to role function or happiness (Guyatt et al. 1993). HRQoL is the ultimate general goal for health care and public health (Tengland 2006) and is

an important measurement in occupational health (McDonald et al. 2011).

Work-related stressors are widely known as a major risk factor for physical and mental health problems among workers (Kivimäki et al. 2006; Harvey et al. 2017). Thus, work-related stressors may also be associated with a deterioration in HRQoL among workers. For instance, a previous cross-sectional study sampled from the general working population reported a significant negative association with job demand and job control (decision latitude) (Karasek 1979) and HRQoL (La Torre et al. 2018). Effort/reward imbalance (Siegrist et al. 2009) was also negatively associated with HRQoL (Krause et al. 2010; Liu et al. 2015). Lack of

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support from supervisors or coworkers has been associated with low HRQoL (Yamada et al. 2016). In specific occupations, such as nursing, occupation-specific work-related stressors such as dealing with death, conflict with colleagues or other medical staff, or pressure from patient and family, were negatively associated with HRQoL (Sarafis et al. 2016). These previous findings suggest that work-related stressors are negatively associated with the HRQoL of workers. However, most indicators of HRQoL are based on the number of symptoms and disabilities due to health problems. Thus, it is difficult to quantitatively estimate the impact of work-related stressors on HRQoL when comparing it with other chronic health conditions, such as hypertension or diabetes.

Among HRQoL indicators, quality-adjusted life years (QALYs) is a unique measure of utility or values assigned to different health states (Whitehead and Ali 2010) and has been applied to personal decision-making, economic evaluation to assess the value of medical interventions, and decision-making to prioritize policy in future medical/public health programs (Weinstein et al. 2009). QALY are used to determine the cost-effectiveness or the relative cost-effectiveness of one intervention for a person or a population. QALY can be calculated only by limited measures of HRQoL, such as ED-5D (Herdman et al. 2011), SF-6D (Ferreira et al. 2013), or HUI (Horsman et al. 2003), and is done by multiplying the QALY score (ranging from 0 to 1) and the length (years) of one person life (Sassi 2006). To determine the impact of work-related stressors on HRQoL measured based on values of health, the association between work-related stressors and QALY should be investigated. To date, only one previous study has done this by reporting that home-care workers in Sweden with a high workload had a statistically significantly lower QALY than their counterparts (Sjöberg et al. 2020). In this study, workers exposed to a high workload had a 0.035-unit lower QALY score than their counterparts. However, the finding is limited, because it was done in a special occupation, i.e., home-care workers. The association of work-related stress with QALY should be investigated among a broader range of occupations, based on well-established theoretical models of work-related stress, such as the job strain model (Karasek 1979) and effort–reward imbalance model (Siegrist et al. 2009). Once the impact is estimated, it would be useful to quantitatively understand the possible impact of work-related stressors on QALY, compared to that of other health conditions. Such research would also be useful for roughly estimating how much investment would be cost-effective for a workplace intervention targeting work-related stressors.

The aim of this cross-sectional study is to investigate the association between work-related stressors (i.e., job strain, effort/reward imbalance, and workplace support) and QALY, assessed by EQ-5D-5L (Herdman et al. 2011), and detect a quantitative decrease of QALY caused by work-related

stressors in a sample from the general working population in Japan. Our study would provide an estimate of loss in QALY associated with the work-related stressors, and such an estimation would be useful in planning cost-effective workplace interventions to reduce work-related stressors.

## Method

### Study design and settings

This was a cross-sectional study using the last year of data from a three-wave cohort study, which was conducted with a working population in Japan in 2017. We only used the data obtained during the last survey, because QALY was only measured in that time. At the final survey, we approached those who were regular workers at the point of the second survey. We utilized an online questionnaire survey hosted by a Japanese online survey company (Macromill, Inc.), which at the time had access to more than 2 million registered members. This study procedure received ethical approval from the research ethics committee of the Graduate School of Medicine and Faculty of Medicine, The University of Tokyo, Japan (No. 10856). Under the approved protocol, we obtained informed consent from every participant through questionnaire instructions on the website. Our study has been reported according to the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines (Vandenbroucke et al. 2007).

### Participants

At the baseline survey from November in 2015 to February in 2016, a total of 5000 workers who had registered with the internet survey company were recruited and completed the survey in order of arrival. Participant recruitment was stratified by sex (male, female) and age (in years; 18–29, 30–39, 40–49, and 50 or more) among sampled workers of registered members. The inclusion criteria were: (a) workers who lived in Japan; and (b) workers employed by private companies, public servants, or freelancers. The Internet survey company has a system that sends an email with a survey to registered members. If the invited workers agree with the terms and conditions, they are able to access the self-reported questionnaire. Participants were first asked some questions about their characteristics, and those who were eligible per the inclusion criteria were able to continue to answer the survey. The email with the survey was sent three times a day (morning, noon, and night), so that the respondents were not biased by the time that the email was sent. Since the Internet survey company approached a target number of the respondents who had met the inclusion criteria, the response rate could not be determined.

At the second survey in December 2016, a total of 3915 workers, who were regular workers at the baseline, were recruited and 2599 workers completed the second survey (response rate: 66.4%). At the final survey, a total of 2530 workers, who were regular workers at the second survey, were recruited. This company provides approximately 80 “Macromill points” (equivalent to 80 yen) for completing the questionnaire.

## Variables and measurements

All variables were measured using the online self-report questionnaire and obtained from the third-wave survey.

### Outcome variable: QALY (HRQoL)

HRQoL was measured using the Japanese version of The EuroQoL-5 Dimensions-5 Levels (EQ-5D-5L) (Herdman et al. 2011). This is the most widely used preference-based HRQoL questionnaire and is applicable to a wide range of health conditions. It comprises five dimensions (mobility, self-care, usual activities, pain or discomfort, and anxiety or depression) and each dimension has five levels to express the perceived problems. A higher score indicates a higher HRQoL. The value set of the Japanese version of the EQ-5D-5L has been developed (Ikeda et al. 2015).

## Exposure variables

### Job strain, supervisor support, and coworker support

Quantitative job demand, job control, supervisor support, and coworker support were assessed by the Brief Job Stress Questionnaire (BJSQ) (Shimomitsu 2000). The questionnaire includes three items for each variable and all items were rated on a 4-point Likert scale. Job strain was the quotient of the score for quantity of job overload divided by the score for job control. A higher score indicates higher job strain. Supervisor support and coworker support were obtained by dividing the total scores by the number of items (three items each), respectively. A higher score indicates better support. The BJSQ has been widely used in Japan to assess psychosocial factors at work and the scales have demonstrated acceptable levels of internal consistency and test–retest reliability, and convergent validity (Inoue et al. 2014). Cronbach’s alpha coefficients for the job demand and job control scales in this study sample were 0.84 and 0.76, respectively. Cronbach’s alpha coefficients for the supervisor support and coworker support scales in this study sample were 0.84 and 0.83, respectively.

## Effort/reward imbalance

Effort/reward imbalance was assessed by the Japanese version of the short version of the Effort/Reward Imbalance (ERI) scale (Siegrist et al. 2009). The scale consists of three questions for effort at work (e.g., “I have constant time pressure due to a heavy work load”) and seven questions for reward at work (e.g., “I receive the respect I deserve from my superior or a respective relevant person.”), and each item was rated on a 4-point Likert scale from 1 (strongly disagree) to 4 (strongly agree). Effort/reward imbalance was calculated as the score of effort divided by the score of reward (then was multiplied by 3/7 to adjust for the number of items for each score). A higher score indicates a higher effort/reward imbalance. These scales have shown good reliability and validity (Kurioka et al. 2013). Cronbach’s alpha coefficients for the effort and reward scales in this study sample were 0.79 and 0.52, respectively.

## Covariates and other demographic variables

Demographic variables and other covariates collected in the questionnaire included sex, age, educational status (junior high school, high school, college, university, or graduate school), occupation (manager, professional and technician, clerk, service worker, production worker, or other), work contract (regular worker, non-regular worker, business owner, or other), smoking habits (no smoking or currently smoking), and alcohol intake (no or yes).

## Post hoc sample size calculation

This study is a secondary analysis using the last-year data from a three-wave cohort study and as such a prior sample size calculation was not conducted. Post hoc calculation was employed to estimate statistical power ( $1-\beta$ ), using G\*power (Faul et al. 2007; Erdfelder et al. 2009). When the  $\alpha$  error was 0.05, total sample size was 1986 and the number of predictors were 20, effect size were 0.009, 0.006, and 0.008, for job strain, effort–reward imbalance, and co-worker support, respectively. As a result, the estimated statistical power was 0.989, 0.989, and 0.933, respectively. The effect size of supervisor support was close to zero, and the estimated statistical power was not able to be calculated.

## Analysis

To calculate the change of the QALY score made by a one standard deviation (SD) change of the score for each work-related stressor, multiple linear regression with a forced entry method was employed for the QALY scores on standardized scores of work-related stressors (job strain, supervisor support, coworker support, and effort–reward imbalance)



with the means being equal to zero and the SD being equal to one. We constructed a bivariate, a crude model, and another model adjusted by sex, age, educational status, occupation, work contract, smoking habit, and alcohol intake. Statistical analysis was performed with SPSS (IBM SPSS Statistic for Windows, version 26.0 Armonk, NY, USA). A two-tailed *p* value of 0.05 was considered significant. We estimated loss of QALY for a 1-year interval associated with these work-related stressors, based on the coefficients obtained from the full-model multiple linear regression assuming that participants would live 1 year with the same level of QALY score. The formula for the multiple linear regression analysis is as follows:

$$\begin{aligned}
 y = & b_0 + b_1 * (\text{jobStrain}) + b_2 * (\text{effort} - \text{rewardimbalance}) \\
 & + b_3 * (\text{supoervisorsupport}) + b_4 * (\text{co} - \text{workersupport}) \\
 & + b_5 * (1 = \text{women}; 0 = \text{men}) + b_6 * (\text{age}) \\
 & + b_7 * (1 = \text{juniorhighschool}; 0 = \text{otherwise}) \\
 & + b_8 * (1 = \text{highschool}; 0 = \text{otherwise}) \\
 & + b_9 * (1 = \text{college}; 0 = \text{otherwise}) \\
 & + b_{10} * (1 = \text{graduateschool}; 0 = \text{otherwise}) \\
 & + b_{11} * (1 = \text{professionalsandtechnicians}; 0 = \text{otherwise}) \\
 & + b_{12} * (1 = \text{clerks}; 0 = \text{otherwise}) \\
 & + b_{13} * (0 = \text{serviceworkers}; 0 = \text{otherwise}) \\
 & + b_{14} * (1 = \text{productionworkers}; 0 = \text{otherwise}) \\
 & + b_{15} * (1 = \text{otheroccupation}; 0 = \text{otherwise}) \\
 & + b_{16} * (1 = \text{non} - \text{regularworkers}; 0 = \text{otherwise}) \\
 & + b_{17} * (1 = \text{businessowners}; 0 = \text{otherwise}) \\
 & + b_{18} * (1 = \text{otherworkcontract}; 0 = \text{otherwise}) \\
 & + b_{19} * (1 = \text{currentlysmoking}; 0 = \text{otherwise}) \\
 & + b_{20} * (1 = \text{yesforalcoholintake}; 0 = \text{no}) + (e).
 \end{aligned}$$

We also conducted a similar multiple regression analysis with appropriate weights to make the distribution of sex, age groups (20–34, 35–49, 50–), and occupation of the sample comparable to that of the entire working population of Japan. The weights were created using data from the Japanese National Labor Force Survey conducted in December 2017 (Ministry of Internal Affairs and Communications, Japan, 2017). However, only a tabulation for the combination of sex and age or sex and occupation was available from this national data. We created the final weight by multiplying a weight based on age distribution and that based on sex and occupation.

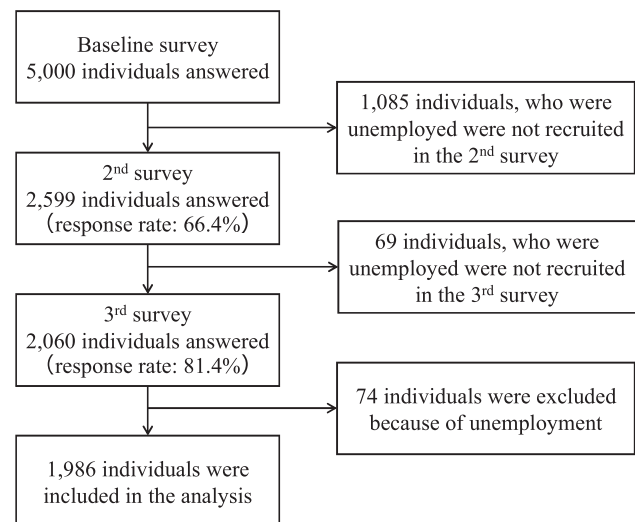


Fig. 1 Participant flowchart

## Results

### Participant characteristics

Of the total 2530 workers who were invited to the final survey, 2060 workers completed the survey (response rate: 81.4%). Due to use of the Internet survey company, we were unable to obtain reasons for no response ( $N=470$ ). Seventy-four individuals out of the 2060 had lost their jobs and were converted to non-workers, and as such were excluded from the analyses. Finally, a total of 1986 workers (78.5%) were included in the analyses (see Fig. 1). Since we hired an Internet survey company, which required the participants to answer all of the questionnaire, there were no missing values in any of the variables or items. Characteristics of those who were included in the analyses are shown in Table 1. Approximately 65% were men and the average age was 45.2 years old. More than half graduated from university or graduate school (54.3%) and most were working as regular workers (83.3%), non-smokers (75.8%), and alcohol intake was a custom (78.9%).

### Association between work-related stressors and QALY

Table 2 shows the cross-sectional association between each work-related stressor and QALY. In the crude model, job strain ( $b = -0.013$ ,  $p < 0.01$ ) and effort–reward imbalance ( $b = -0.010$ ,  $p < 0.01$ ) were negatively and significantly associated with QALY, and coworker support ( $b = 0.016$ ,  $p < 0.01$ ) was positively and significantly associated with QALY. In the fully adjusted model, job strain ( $b = -0.013$ ,  $p < 0.01$ ) and effort–reward imbalance ( $b = -0.011$ ,

**Table 1** Demographic and work-related characteristics and job stressors in an Internet sample from the general working population of Japan ( $N=1986$ )

	<i>N</i> (%)	Mean (SD)
Sex		
Men	1,286 (64.8 %)	
Women	700 (35.2 %)	
Age		45.2 (10.4)
Marital status		
Currently married	1,130 (56.9 %)	
Currently not married	856 (43.1 %)	
Educational history		
Junior high school	6 (0.3 %)	
High school	494 (24.9 %)	
College	406 (20.4 %)	
University	946 (47.6 %)	
Graduate school	134 (6.7 %)	
Occupation		
Managers	297 (15.0 %)	
Professionals and Technicians	413 (20.8 %)	
Clerks	721 (36.3 %)	
Service workers	228 (11.5 %)	
Production workers	273 (13.7 %)	
Others <sup>4</sup>	54 (2.7 %)	
Work contract		
Regular workers	1,655 (83.3 %)	
Non-regular workers	273 (13.8 %)	
Business owners	25 (1.3 %)	
Others	33 (1.7 %)	
Smoking habits		
No smoking	1,505 (75.8%)	
Currently smoking	481 (24.2%)	
Alcohol intake		
No	420 (21.1%)	
Yes	1,566 (78.9%)	
QALY (HRQoL: Eq5d5l)		0.91 (0.12)
BJSQ <sup>a</sup> scores		
Quantitative job overload		2.38 (0.74)
Job control		2.36 (0.66)
Job strain <sup>b</sup>		1.12 (0.59)
Supervisor support		2.20 (0.73)
Coworker support		2.34 (0.70)
Effort/Reward imbalance questionnaire		
Effort score		7.63 (2.07)
Reward score		17.1 (2.76)
Effort/reward imbalance		1.06 (0.32)

<sup>a</sup>Brief job stress questionnaire<sup>b</sup>Job strain was calculated by dividing quantitative job overload by job control.

$p < 0.01$ ) were negatively and significantly associated with QALY, and coworker support ( $b = 0.017$ ,  $p < 0.01$ ) was positively and significantly associated with QALY. However, supervisor support did not show a significant association with QALY in both the crude ( $b = 0.003$ ,  $p = 0.380$ ) and adjusted models ( $b = 0.001$ ,  $p = 0.716$ ). In the multiple linear regression using the sampling weights, the results were very similar (Supplementary table S1): job strain ( $b = -0.017$ ,  $p < 0.01$ ) and effort–reward imbalance ( $b = -0.011$ ,  $p < 0.01$ ) were negatively and significantly associated with QALY, and coworker support ( $b = 0.017$ ,  $p < 0.01$ ) was positively and significantly associated with QALY.

## Discussion

To the best of our knowledge, the present study is the first to investigate the association between work-related stressors (job strain, effort-reward imbalance, and workplace support) and QALY in a sample from the general working population. This study showed significant associations of job strain, effort/reward imbalance, and support from coworkers with QALY among respondents, even after adjusting for demographics, lifestyle, and work-related variables. The results were similar when the sample was weighted to match the distribution of sex, age, and occupation to national statistics. This study indicated that these work-related stressors were associated with a decrement of QALY, i.e., value in health status.

Job strain and effort/reward imbalance were significantly and negatively associated with QALY in a general working population. The observed association between job strain and QALY was consistent with an earlier study (Sjöberg et al. 2020) that reported the association of job demands and job control with QALY among home-care workers. The finding was also consistent with previous studies where job strain and effort/reward imbalance were associated with lower HRQoL (Krause et al. 2010; Liu et al. 2015; Sarafis et al. 2016; La Torre et al. 2018). Thus, the findings suggest that job strain and effort/reward imbalance are risk factors for lowering QALY and HRQoL in a general working population. Both high job strain and high effort/reward imbalance are predictors of depression and anxiety (Harvey et al. 2017). Additionally, both are also known to be risk factors of musculoskeletal pain that evoke physiological responses (e.g., increased muscle tension) (Lang et al. 2012; Herr et al. 2015). Such conditions, induced by high job strain and high effort–reward imbalance, impose impaired functioning of the body and result in a lower QALY.

This study showed a significant association between coworker support and QALY. It has been reported that social support can buffer the effect of work overload on QALY (Sjöberg et al. 2020). This is the first study to investigate

**Table 2** The association between work-related stressor and QALY measured by EQ-5D-5L in an Internet sample from the general working population of Japan. ( $N=1,986$ )<sup>a</sup>

	Bivariate			Crude			Fully adjusted <sup>b</sup>		
	b <sup>d</sup>	SE	p	B <sup>d</sup>	SE	p	B <sup>d</sup>	SE	p
Work-related stressor <sup>c</sup>									
Job strain	− 0.013**	0.003	<0.001	− 0.013**	0.003	<0.001	− 0.013**	0.003	<0.001
Effort–reward imbalance	− 0.010**	0.003	<0.001	− 0.010**	0.003	<0.001	− 0.011**	0.003	<0.001
Supervisor support	− 0.003	0.004	<0.380	− 0.003	0.004	<0.380	− 0.001	0.004	<0.716
Coworker support	− 0.016**	0.004	<0.001	− 0.016**	0.004	<0.001	− 0.017**	0.004	<0.001
Sex (ref: Man)									
Woman	− 0.021**	0.006	<0.001				− 0.001**	0.000	<0.004
Age	− 0.001**	<0.001	<0.001				− 0.019*	0.007	<0.032
Education (ref: University)									
Junior high school	− 0.005	0.007	0.437				− 0.004	0.007	<0.581
High school	− 0.010	0.007	0.181				− 0.001	0.007	<0.867
College	− 0.007	0.011	0.512				− 0.014	0.011	<0.211
Graduate school	− 0.035	0.050	0.479				− 0.053	0.049	<0.279
Occupation (ref: Managers)									
Professionals and technicians	− 0.027**	0.009	0.003				− 0.014	0.009	<0.131
Clerks	− 0.023**	0.008	0.005				− 0.003	0.009	<0.751
Service workers	− 0.018	0.011	0.098				− 0.010	0.011	<0.369
Production workers	− 0.023*	0.010	0.022				− 0.002	0.011	<0.856
Others	− 0.001	0.018	0.970				− 0.012	0.018	<0.495
Work contract (ref: Regular workers)									
Non-regular workers	− 0.018*	0.008	0.021				− 0.020	0.008	<0.014
Business owners	− 0.002	0.025	0.939				− 0.012	0.024	<0.623
Others	− 0.021	0.021	0.327				− 0.026	0.021	<0.214
Smoking habits (ref: no smoking)									
Currently smoking	− 0.004	0.006	0.564				− 0.008	0.006	<0.219
Alcohol intake (ref: no)									
Yes	0.005	0.007	0.452				− 0.002	0.007	<0.801
R <sup>2</sup>				− 0.058**		<0.01	− 0.075**		<0.001
ΔR <sup>2</sup>							− 0.017**		<0.002

\* $p < 0.05$ , \*\* $p < 0.01$ <sup>a</sup>Multiple regression analysis was conducted, and the exposure variables were standardized to examine the association<sup>b</sup>Adjusted by sex, age, educational status, occupations, work contract, smoking habits, and alcohol intake<sup>c</sup>Standardized scores<sup>d</sup>An unstandardized coefficient for one SD increase in psychosocial factors at work is shown

the direct effects on QALY. This result was consistent with a previous finding that low coworker support was associated with HRQoL among workers with chronic pain (Yamada et al. 2016). Low workplace support has a significant association with the development of depression (Netterstrøm et al. 2008) and is a risk factor for back pain (Hoogendoorn et al. 2000). These negative impacts of low workplace support in the health outcomes of workers can be considered as reasons for decreased QALY. In this study, supervisor support was not significantly associated with QALY, even though the association was slightly positive. The reason could be that there might be a difference in recognizing supervisor

and coworker support. In a systematic review, the impact of coworker support on depression was reported as greater than that of supervisor support (Netterstrøm et al. 2008). In a team-based workplace where individuals work with one another to complete projects, coworker support is thought to have a greater impact and brings about a positive effect by improving role perceptions, work attitudes, and individual effectiveness (Chiaburu and Harrison 2008). Coworker support may be more important for QALY than supervisor support. However, the differential impact of source-specific social support on QALY should be further investigated in a future study.



The decrease of QALY associated with one SD change in job strain, effort–reward imbalance, and co-worker support were  $-0.013$ ,  $-0.011$ , and  $-0.017$ , respectively. The sum of the estimated loss of QALY due to these work-related stressors ( $-0.041$ ) is larger than a previous estimate of loss of QALY due to high workload ( $-0.035$ ) in a sample of home-care workers (Sjöberg et al. 2020), and is close to QALY losses due to chronic diseases such as hypertension ( $-0.03$ ), stage 1 chronic kidney disease ( $-0.04$ ), asthma ( $-0.05$ ), or neuropathic pain ( $-0.07$ ) (Van Wilder et al. 2019). If combined, these work-related stressors may impact QALY at a similar or even greater extent than these chronic diseases.

Guidelines from the cost-effectiveness analysis indicate that an intervention costing 20,000–30,000 lb per one QALY gain is cost-effective (McCabe et al. 2008). Accordingly, it is cost-effective if a workplace intervention improves 1 SD of job strain at a cost of 260–390 British pounds per employee ( $=20,000-30,000 \times 0.013$ ) or 1 SD of these three work-related stressors at a cost of 820–1,230 lb per employee ( $=20,000-30,000 \times 0.041$ ). This might be too simple an estimation. Additionally, this is from a societal perspective and not from an employer perspective. However, a workplace intervention to improve work-related stressors (such as job strain, effort–reward imbalance, and coworker support) may be quite cost-effective.

## Limitations

Our study has several limitations. First, the study employed a cross-sectional design and as such the findings have a possibility of reverse causality. To determine valid prospective associations between occupational stress factors and HRQoL, a longitudinal or cohort study is needed. Second, the present study uses the final-year data of a cohort study. Every survey in this cohort study was conducted via a Japanese Internet survey company and we were unable to calculate the initial response rate at baseline or obtain the reasons for dropouts in the second and the last survey, and thus, there may be response bias. Third, all variables were measured by a self-reported survey, and as such, there is a possibility that the participants answered the questionnaire to be socially desirable, which may cause reporting bias. Fourth, diagnosis of chronic disease or psychiatric disorders at baseline was not adjusted in this research. This may produce an overestimation of the results. Fifth, participant recruitment was not done thru random sampling. All participants were recruited through the survey company, and thus, the results may not adequately reflect the whole Japanese working population.

## Conclusion

The current study found that job strain, effort/reward imbalance, and lack of coworker support were significantly associated with QALY in a sample of Japanese workers. These work-related stressors may be important risk factors for decreased QALY.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s00420-021-01710-1>.

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**Authors contributions** YH, KI, KW, AT, AS, AI, HH, YO, YA, TY, EY, and NK: have made substantial contributions to conception, design of the work, and the acquisition, analysis, and interpretation of the data. We have drafted and revised the work and approved the version to be published. We also agree to be accountable for all aspects of the work.

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## Declarations

**Conflicts of interest** Norito Kawakami is currently receiving grants from Fujitsu Ltd., Fujitsu Software Technologies Ltd, SB At Work Corp., personal fees from Occupational Health Foundation, Japan Dental Association, Sekisui Chemicals, Junpukai Health Care Center, Osaka Chamber of Commerce and Industry, and non-financial support from Japan Productivity Center as relevant financial activities outside the submitted work. For the remaining authors, none were declared.

**Ethical approval** This work has been approved by the research ethics committee of the Graduate School of Medicine and Faculty of Medicine, The University of Tokyo, Japan.

**Consent to participate** We have obtained informed consent via the Internet survey.

**Consent for publication** This manuscript is not currently being considered by another publication, is not in press in any other format, and has not been published previously. We will comply with all the copyright and proprietary regulations as stipulated by International Archives of Occupational and Environmental Health.












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Article

# Reliability and Validity of the Japanese Version of the 12-Item Psychosocial Safety Climate Scale (PSC-12J)

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**Abstract:** The 12-item psychosocial safety climate scale (PSC-12) has been used extensively in previous research, but its reliability and validity in a Japanese context are still unknown. We examined the psychometrics of the Japanese version of the PSC-12 (PSC-12J). The PSC-12J and scales on the relevant variables were administered to 2200 employees registered with an online survey company. A follow-up survey with 1400 of the respondents was conducted two weeks later. Internal consistency and test–retest reliability were examined via Cronbach’s alpha and Cohen’s weighted kappa coefficients, respectively. Structural, convergent, and known-group validities were examined using confirmatory factor analysis (CFA) and item response theory (IRT) analysis, correlation analysis, and Kruskal–Wallis test, respectively. Cronbach’s alpha and Cohen’s weighted kappa coefficients were 0.97 and 0.53, respectively. CFA based on the four-factor structure established in the previous literature showed an acceptable model fit. IRT analysis showed that each item was an adequate measure of the respondent’s latent trait. Correlations of the PSC-12J with the relevant variables and distribution of scores by demographic characteristics were also observed in the theoretically expected directions, supporting the construct validity of the PSC-12J. Our findings establish the PSC-12J as a reliable and valid measure of the psychosocial safety climate construct in the Japanese context.

**Keywords:** job demands-resources (JD-R) model; primary prevention; psychometric properties; psychosocial risks; work stress



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## 1. Introduction

In Japan, nearly 60% of employees suffer from stress and other problems at work [1]. Applications for compensation for work-related injuries due to mental disorders have seen more than a tenfold increase over the past two decades [2], and the further dissemination of not only approaches to individuals, but also to organizations via improvements in psychosocial work environment, is required as a measure for mental health among employees [3]. Psychosocial safety climate (PSC) is a dimension of organizational climate and refers to shared employee perceptions regarding “policies, practices, and procedures for the protection of psychological health and safety among employees” [4]. Previous studies in Australia, where PSC was first proposed and developed, have shown that employee perceptions of low PSC were associated with a variety of adverse mental and physical health, as well as safety outcomes, such as psychological distress, emotional exhaustion, circulatory diseases, and occupational injuries [5–7]. Given that PSC is an upstream predictor of these outcomes, it is important to establish whether this construct is generalizable to different cultural settings, and to assess it in a variety of national contexts.

PSC is proposed as an organizational factor that stems primarily from management and is an antecedent of task-level or workgroup-level hazards [8]. Therefore, PSC is a precursor to factors covered in previous dominant job stress theories, such as the job demand-resources (JD-R) model [9] and its foundations, i.e., the job demands-control (JD-C)/demand-control-support (DCS) [10,11] and effort–reward imbalance (ERI) models [12].

PSC theory extends pathways inherent in the above-mentioned job stress theories, because it is an antecedent to the job hazards specified in them. In the present study, we use the PSC-extended JD-R model [4] to frame our expectations about how PSC relates to its variables and our decisions in selecting variables for study. In this model, PSC extends the health erosion path of the JD-R model, whereby low PSC increases job demands (e.g., psychological demands and emotional demands), which in turn deteriorate employee mental and physical health (i.e., the health impairment process). PSC extends the motivational path of the JD-R model, whereby high PSC increases the available job resources (e.g., job control, extrinsic reward, and workplace social support), which in turn enhances work engagement (i.e., the motivational process). These extended theoretical paths were supported by empirical studies [4,5,13].

In terms of PSC composition, there are four components: management commitment (MC); management priority (MP); organizational communication (OC); and organizational participation (OP). MC refers to whether senior management is supportive and committed to stress prevention through involvement and commitment. MP refers to whether management prioritizes the psychological health and safety of their employees over productivity goals. OC refers to whether an organization listens to contributions from employees in relation to factors that affect psychological health. OP refers to whether there is a consultation and active participation in health and safety matters from all levels of the organization.

Whilst the first measurement scale that was developed based on the definition of PSC contained 26 items [14], with successive large-scale, population-based research, the scale was systematically reduced to 12 items (three for each subscale). This “PSC-12” [8] was shown to have an acceptable internal consistency (Cronbach’s alpha coefficients, PSC-12: 0.94–0.97; MC: 0.88–0.91; MP: 0.90; OC: 0.76–0.77; and OP: 0.80), structural validity (confirmatory factor analysis (CFA) demonstrated an acceptable model fit and supported the four-factor model), and other aspects of construct validity (mainly convergent validity), such as correlations with other relevant psychosocial work environments and health-related outcomes [5–8]. Moreover, the PSC-12 was translated into some Asian (e.g., Malay and Chinese) and European languages (e.g., Dutch, French, German, and Swedish), and their reliability and validity, as well as epidemiological findings using the translated scales, were reported [15–19]. On the other hand, in Japan, the concept of PSC is not well known, and thus there are no epidemiological findings on the association of PSC with health among Japanese employees. The concept of PSC, which focuses on “whether management and employees are working together to maintain and promote mental health”, may have a high affinity with Japanese workplaces that are promoting health and productivity management (H&PM), a positive movement that is expected to spread in Japan in the future. Therefore, translating the PSC-12 into Japanese and establishing its psychometrics will be beneficial for research and the practice of occupational health in Japan.

The purpose of the present study was to examine the reliability (i.e., internal consistency and test–retest reliability) and validity (i.e., structural, convergent, and known-group validities) of the Japanese version of the PSC-12 (hereinafter called “PSC-12J”) in a general working population in Japan. The present study was reported in accordance with the Consensus-Based Standards for the Selection of Health Measurement Instruments (COSMIN) Risk of Bias (RoB) checklist (Boxes 3, 4, 6, 7, and 9), which is used to improve the quality of efforts to develop health-related, self-report measurement instruments [20].

## 2. Materials and Methods

### 2.1. Participants

From October to November 2020, an online survey was conducted with registrants of Rakuten Insight, Inc., a private Japanese online survey company. A total of 87,060 people (42,784 men and 44,276 women) were randomly selected from approximately 1.19 million possible registrants (570,000 men and 620,000 women). In the advertisement to the randomly selected audience, participation was incentivized with online shopping points valued at approximately a few US dollars. Responses were on a first-come-first-served basis, and, due to the project budget, the recruitment ceased when the number of respondents reached our target  $N = 2200$  (RoB Box 3-3). The 2200 participants answered (1) “I am currently working.” and (2) “I am employed by a company, organization, government office, or self-employed person or private family to earn a salary or wage (including executives).” in the preliminary eligibility screening in order to participate in the main (baseline) survey, which included the PSC-12J and scales on relevant variables. In this baseline survey, the sex ratio was 1:1 and there were an equal number of participants in each age group (20–29, 30–39, 40–49, 50–59, and 60–69 years) due to the ‘stratified sample’ recruitment process.

To further examine the test–retest reliability of the PSC-12J, a follow-up online survey using the PSC-12J was conducted two weeks later, which is the recommended time interval for test–retest reliability (RoB Boxes 6-2 and 7-2) [21]. As with the baseline survey, responses to the follow-up survey were on a first-come-first-served basis and ceased when the number of respondents reached  $N = 1400$  (RoB Boxes 6-1, 6-3, 7-1, and 7-3). Because the online survey required all questions to be answered, no participants had missing items.

### 2.2. Measures

#### 2.2.1. PSC-12J

The Japanese translation of the PSC-12 was conducted in collaboration with an Australian team who worked in PSC research (S.S.M. and M.F.D.; S.S.M. is fluent in Japanese) and a Japanese team of experts in job stress research (A.I., H.E., and A.T.). The PSC-12 comprises four subscales (MC, MP, OC, and OP) based on the reflective model, and each subscale is measured with three items (e.g., MC: “In my workplace, senior management acts quickly to correct problems/issues that affect employees’ psychological health”. MP: “Psychological well-being of staff is a priority for this organization”. OC: “There is good communication here about psychological safety issues which affect me”. OP: “Participation and consultation in psychological health and safety occurs with employees, unions, and health and safety representatives in my workplace”). Each item is measured on a five-point Likert-type response option: 1 = *Strongly disagree*; 2 = *Disagree*; 3 = *Neither agree nor disagree*; 4 = *Agree*; and 5 = *Strongly agree*. The total scores of the PSC-12 (range: 12–60) and its subscales (range: 3–15) are calculated by summing item scores, with higher score indicative of better status.

The translation process of the PSC-12 was based on the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) taskforce guidelines [22]. For the forward translation (from English to Japanese), the Japanese team prepared a draft of the translation and conducted cognitive interviews with occupational health professionals, researchers, and laypersons, asking them to comment on its readability. In parallel, the Japanese team asked the Australian team to make general comments on the draft. After slight amendments to the draft based on comments from cognitive interviews and the Australian team, the amended version was back-translated into English by an independent translator who was blind to the original English version. The back-translated version was reviewed again and harmonized by the Australian team, and the Japanese version was finalized after further slight amendments based on their suggestions. The result was a robust translation of the PSC-12, which in theory presents an accurate reflection of the PSC construct and its four subscales in Japanese.



### 2.2.2. Relevant Variables (RoB Boxes 9-1 and 9-2)

- Job demands

Based on a previous study on the development of the original PSC-12 [8], we selected (1) psychological demands; (2) physical demands; and (3) emotional demands as the job demands that should show negative relationships with PSC. Scales that measure these constructs were selected from existing well-validated Japanese versions that demonstrated reliable metrics in previous research [23–25].

Psychological demands were measured with the 22-item version of the Job Content Questionnaire (JCQ) [23,26]. The JCQ includes a five-item psychological demands scale, measured on a four-point Likert-type scale ranging from 1 = *Strongly disagree* to 4 = *Strongly agree*. The total score (range: 12–48) was calculated according to the JCQ user's guide [26]. In this sample, Cronbach's alpha coefficient was 0.65.

Physical demands were measured with the Brief Job Stress Questionnaire (BJSQ) [24]. The BJSQ includes a single-item physical demands scale, "My job requires a lot of physical work.", measured on a four-point Likert-type scale ranging from 1 = *Not at all* to 4 = *Very much so*.

Emotional demands were measured with the New Brief Job Stress Questionnaire (NBJSQ) [25]. The NBJSQ includes a three-item emotional demands scale, measured on a four-point Likert-type scale ranging from 1 = *Not at all* to 4 = *Definitely*. The total score (range: 3–12) was calculated by summing the scores for each item. In this sample, Cronbach's alpha coefficient was 0.91.

For these scales, higher scores indicate a more demanding or stressful situation.

- Job resources

For the same reason as mentioned above [8], we selected (1) decision authority; (2) skill discretion; (3) extrinsic reward; (4) supervisor support; and (5) coworker support as job resources which should show positive relationships with PSC. Again, we used existing well-validated Japanese versions of scales that measure these constructs [23,27].

Decision authority, skill discretion, supervisor support, and coworker support were measured with the JCQ [23,26] introduced above. The JCQ includes a three-item decision authority; a six-item skill discretion; a four-item supervisor support; and a four-item coworker support scales, measured on a four-point Likert-type scale ranging from 1 = *Strongly disagree* to 4 = *Strongly agree*. The total scores (range: 12–48 for decision authority and skill discretion; 4–16 for supervisor support and coworker support) were calculated according to the JCQ user's guide [26]. In this sample, Cronbach's alpha coefficients were 0.72, 0.67, 0.91, and 0.87 for decision authority, skill discretion, supervisor support, and coworker support, respectively.

Extrinsic reward was measured with the short version of the Effort–Reward Imbalance Questionnaire (Short ERIQ) [27,28]. The Short ERIQ includes a seven-item extrinsic reward scale measured on a four-point Likert-type scale ranging from 1 = *Strongly disagree* to 4 = *Strongly agree*. Of the seven items, three items indicate an adverse condition, and the other four do not; the scoring for the former adverse items is reversed such that the overall scale measured 'positive' extrinsic rewards. The total score (range: 7–28) was calculated by summing the scores for each item. In this sample, Cronbach's alpha coefficient was 0.68.

For these scales, higher scores indicate more resources at work.

- Outcomes

For outcome measures which should show significant relationships with PSC, we focused not only on negative measures, but also positive measures. For the negative measures, we selected (1) psychological distress and (2) emotional exhaustion, whereas, for the positive measures, we selected (3) self-rated health; (4) work engagement; and (5) job satisfaction [8]. Established Japanese versions of scales were used to measure these constructs [24,29–31].

Psychological distress was measured with the K6 scale [29,32]. The K6 scale comprises six items measuring the levels of psychological distress on a five-point Likert-type scale

ranging from 0 = *None of the time* to 4 = *All of the time*. The total score (range: 0–24) was calculated by summing the scores for each item. In this sample, Cronbach's alpha coefficient was 0.94.

Emotional exhaustion was measured with the Burnout Assessment Tool (BAT) [30,33]. The BAT includes an eight-item emotional exhaustion scale, measured on a five-point Likert-type scale ranging from 1 = *Never* to 5 = *Always*. The total score (range: 1–5) was calculated by averaging the scores for each item. In this sample, Cronbach's alpha coefficient was 0.94.

Self-rated health was measured with a single-item question "What is your current state of health?", on a five-point Likert-type scale ranging from 1 = *Not good* to 5 = *Good*.

Work engagement was measured with the nine-item version of the Utrecht Work Engagement Scale (UWES-9) [31,34]. The UWES-9 comprises nine items measuring the levels of work engagement on a seven-point Likert-type scale ranging from 0 = *Never* to 6 = *Always (everyday)*. The total score (range: 0–6) was calculated by averaging the scores for each item. In this sample, Cronbach's alpha coefficient was 0.96.

Job satisfaction was measured with the BJSQ [24] introduced above. The BJSQ includes a single-item job satisfaction scale "I am satisfied with my job." measured on a four-point Likert-type scale ranging from 1 = *Dissatisfied* to 4 = *Satisfied*.

For the negative measures (i.e., psychological distress and emotional exhaustion), higher scores indicate higher levels of distress or exhaustion, whereas, for the positive measures (i.e., self-rated health, work engagement, and job satisfaction), higher scores indicate a better condition.

### 2.2.3. Demographic Characteristics

For demographic characteristics, we measured sex, age group, education, and occupation. Information regarding sex and age group (20–29, 30–39, 40–49, 50–59, and 60–69 years) was obtained from the participant data that were registered to the online survey company. Information on education and occupation was obtained from the online survey. Education was classified into four groups: graduate school, college, junior college, and high school or junior high school. Occupation was also classified into four groups: manager, non-manual, manual, and others (RoB Box 9-5).

### 2.3. Statistical Analysis

Because the Kolmogorov–Smirnov test did not show normality in the distribution of the total scores of the PSC-12J and its subscales ( $p < 0.001$ ), nonparametric tests were mainly used to test the hypotheses. We first calculated the means, standard deviations (SDs), medians, and quartile deviations (QDs) for the total scores of the PSC-12J and its subscales.

Then, to examine the internal consistency and test–retest reliability, Cronbach's alpha coefficient (RoB Box 4-2) and Cohen's weighted kappa coefficient with linear weight (RoB Boxes 6-5 to 6-7) were calculated, respectively. As parametric statistics for test–retest reliability, intraclass correlation coefficient (ICC [1,1]) (RoB Box 6-4) and standard error of measurement (SEM) (RoB Box 7-4) were also calculated. For the calculation of the Cohen's weighted kappa coefficient, ICC, and SEM, we used data from 1400 participants who responded to the follow-up survey.

Furthermore, to examine the structural validity, CFA was conducted, which allowed us to assess the goodness of fit for the structure of PSC established in other literature (i.e., four-factor structure of MC, MP, OC, and OP) (RoB Box 3-1). Model fit was assessed using a combination of fit indices including the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the comparative fit index (CFI), the Tucker–Lewis index (TLI), and the root mean square error of approximation (RMSEA). The acceptability of model fit was judged by the following criteria: GFI, AGFI, CFI, and TLI  $> 0.90$  and RMSEA  $< 0.08$  [35]. Then, an item response theory (IRT) analysis with the generalized partial credit model [36] (RoB Box 3-2) was conducted for each subscale to estimate discrimination ( $a$ ) and difficulty ( $b$ /threshold) for each item. If the discrimination was  $a > 0.50$  and the difficulty was  $|b| < 4.00$ , the item was judged to be an adequate measure of the respondent's latent trait [37,38].

Furthermore, as a hypothesis test for convergent validity, Spearman's rank correlation coefficients were calculated between scores on the PSC-12J and its subscales and relevant variables introduced earlier (RoB Box 9-3). Following Cohen [39], we describe effects as small (0.10), medium (0.30), and large (0.50). Based on findings from a previous study [8], it was hypothesized that the PSC-12J (and its subscales) would show small-to-medium negative correlations with psychological demands and emotional demands ( $-0.30 < \rho < -0.10$ ). It was also hypothesized that the PSC-12J would show a negative correlation with physical demands, but that it would be quite small ( $-0.10 < \rho < 0$ ) since PSC focuses mainly on psychosocial safety rather than physical safety. For job resources, it was hypothesized that the PSC-12J would show small-to-medium positive correlations regarding decision authority, skill discretion, and coworker support ( $0.10 < \rho < 0.30$ ), which are individual-level or interpersonal-level resources; and medium-to-large positive correlations with extrinsic reward and supervisor support ( $\rho > 0.30$ ), which are more closely related to management behavior. For outcome measures, it was hypothesized that the PSC-12J would show small-to-medium negative correlations with poor psychological-health-related measures (psychological distress and emotional exhaustion) ( $-0.30 < \rho < -0.10$ ) and a positive correlation with self-rated health ( $0.10 < \rho < 0.30$ ); and medium-to-large positive correlations with work motivation (work engagement and job satisfaction) ( $\rho > 0.30$ ) [8].

Lastly, the Kruskal–Wallis test was conducted as another hypothesis test for known-group validity to compare the mean ranks of the PSC-12J and its subscales on each demographic characteristic (RoB Box 9-6). Japanese companies have a male-oriented corporate culture [40], and people with higher education levels are more likely to have a job with a better (or more resourceful) work environment [41]. Since people in managerial positions are directly involved in the construction of the PSC, we hypothesized that the mean ranks of the PSC-12J would be higher among men, those with a higher education, and managers.

The level of significance was 0.05 (two-tailed). All the analyses were conducted using the IBM SPSS Statistics Version 27.0, Amos Version 27.0, and Stata 14.2.

### 3. Results

Table 1 shows the detailed characteristics of the participants at the baseline and follow-up surveys. As noted earlier, the sex ratio and the number of participants in each age group were equal. For education and occupation, college graduates and non-manual employees had the highest proportions. There were no differences in the distribution of demographic characteristics between the baseline and follow-up surveys (RoB Box 9-5).

Table 2 shows means, SDs, medians, QDs, Cronbach's alpha coefficients, Cohen's weighted kappa coefficients, ICCs, and SEM for the PSC-12J and its subscales (RoB boxes 4-1, 4-2, 6-4, 6-6, and 7-4). Cronbach's alpha coefficients were high for all subscales, suggesting good internal consistency. Furthermore, Cohen's weighted kappa coefficients and ICCs showed a moderate test–retest reliability.

**Table 1.** Demographic characteristics of employees who participated in the present study.

Demographic Characteristics	Baseline	Follow-Up <sup>1</sup>
	<i>n</i> (%)	<i>n</i> (%)
<b>Sex</b>		
Men	1100 (50.0)	700 (50.0)
Women	1100 (50.0)	700 (50.0)
<b>Age</b>		
20–29 years old	440 (20.0)	281 (20.1)
30–39 years old	440 (20.0)	281 (20.1)
40–49 years old	440 (20.0)	279 (19.9)
50–59 years old	440 (20.0)	281 (20.1)
60–69 years old	440 (20.0)	278 (19.9)



Table 1. Cont.

Demographic Characteristics	Baseline	Follow-Up <sup>1</sup>
	<i>n</i> (%)	<i>n</i> (%)
<b>Education</b>		
Graduate school	126 (5.73)	87 (6.21)
College	1054 (47.9)	655 (46.8)
Junior college	491 (22.3)	299 (21.4)
High school/Junior high school	529 (24.0)	359 (25.6)
<b>Occupation</b>		
Manager	249 (11.3)	158 (11.3)
Non-manual	1508 (68.5)	959 (68.5)
Manual	294 (13.4)	188 (13.4)
Others	149 (6.77)	95 (6.79)

<sup>1</sup> Follow-up sample was used only to examine the test–retest reliability.

**Table 2.** Means, standard deviations (*SDs*), medians, quartile deviations (*QDs*), Cronbach’s  $\alpha$  coefficients, Cohen’s weighted  $\kappa$  coefficients, intraclass correlation coefficients (*ICCs*), and standard error of measurement (*SEM*) for the PSC-12J and its subscales (*N* = 2200 for mean, *SD*, median, *QD*, and Cronbach’s  $\alpha$  coefficient; *N* = 1400 for Cohen’s weighted  $\kappa$  coefficient, *ICC*, and *SEM*).

Scale (Score Range)	Mean	<i>SD</i>	Median	<i>QD</i>	Cronbach’s $\alpha$	Cohen’s Weighted $\kappa$ (95% <i>CI</i> ) <sup>1</sup>	<i>ICC</i> (95% <i>CI</i> ) <sup>1</sup>	<i>SEM</i> (95% <i>CI</i> ) <sup>1</sup>
PSC-12J (total) (12–60)	34.8	11.4	36.0	7.5	0.97	0.53 (0.50–0.56)	0.69 (0.67–0.72)	6.31 (6.03–6.59)
<b>PSC-12J subscales</b>								
Management commitment (3–15)	8.71	3.07	9.0	2.5	0.93	0.48 (0.45–0.52)	0.63 (0.60–0.66)	1.84 (1.76–1.92)
Management priority (3–15)	8.77	3.17	9.0	2.5	0.94	0.49 (0.46–0.52)	0.64 (0.61–0.67)	1.88 (1.80–1.96)
Organizational communication (3–15)	8.77	3.01	9.0	2.0	0.91	0.49 (0.46–0.52)	0.65 (0.62–0.68)	1.76 (1.69–1.84)
Organizational participation (3–15)	8.52	3.07	9.0	2.0	0.92	0.49 (0.46–0.52)	0.64 (0.61–0.67)	1.81 (1.73–1.89)

<sup>1</sup> *CI* = confidence interval.

Table 3 shows the results of the CFA and IRT analysis assuming the four-factor structure of MC, MP, OC, and OP. For CFA, standardized factor loadings were greater than 0.85 and all significant for each factor. Furthermore, covariances among factors were greater than 0.80 and all significant. Fit indices showed that the originally hypothesized four-factor structure yielded an acceptable model fit (*GFI* = 0.97; *AGFI* = 0.94; *CFI* = 0.99; *TLI* = 0.98; and *RMSEA* = 0.06) (RoB Box 3-1). For IRT analysis, all items met the criteria of *a* > 0.50 for discrimination and  $|b| < 4.00$  for difficulty, indicating that each item adequately measured the respondent’s latent trait. The standard errors of the theta (*SE*( $\theta$ )) for each subscale were all 0.020 (RoB Box 4-4).

**Table 3.** Confirmatory factor analysis (standardized factor loading of items in the four-factor structure and covariance among factors) and item response theory analysis (discrimination and difficulty of items and standard error of the theta ( $SE(\theta)$ ) in each subscale) of the PSC-12J ( $N = 2200$ ).

	Confirmatory Factor Analysis (CFA) <sup>1</sup>				Item Response Theory (IRT) Analysis <sup>2</sup>				SE( $\theta$ )	
	Standardized Factor Loading				Discrimination ( <i>a</i> )	Difficulty ( <i>b</i> /Threshold)				
	MC	MP	OC	OP		<i>b</i> <sub>1</sub> (2 vs. 1)	<i>b</i> <sub>2</sub> (3 vs. 2)	<i>b</i> <sub>3</sub> (4 vs. 3)		<i>b</i> <sub>4</sub> (5 vs. 4)
Management commitment (MC)									0.020	
Q1. MC1 (Act quickly)	0.90				4.31	−1.17	−0.44	0.49	1.55	
Q2. MC2 (Act decisively)	0.93				7.62	−1.10	−0.40	0.52	1.55	
Q3. MC3 (Show support)	0.90				3.80	−1.09	−0.38	0.64	1.63	
Management priority (MP)									0.020	
Q4. MP1 (Priority)		0.88			3.13	−1.05	−0.39	0.63	1.65	
Q5. MP2 (Importance)		0.93			6.17	−1.07	−0.38	0.43	1.34	
Q6. MP3 (As important as productivity)		0.94			8.98	−1.00	−0.37	0.49	1.35	
Organizational communication (OC)									0.020	
Q7. OC1 (Good communication)			0.86		2.96	−1.27	−0.61	0.44	1.66	
Q8. OC2 (Information available)			0.88		4.15	−1.04	−0.39	0.63	1.59	
Q9. OC3 (Contribution being listened to)			0.90		3.51	−1.20	−0.54	0.55	1.67	
Organizational participation (OP)									0.020	
Q10. OP1 (Actual participation)				0.86	3.12	−1.01	−0.41	0.68	1.61	
Q11.OP2 (Participation being encouraged)				0.91	4.91	−1.12	−0.45	0.52	1.57	
Q12. OP3 (Prevention involves all levels)				0.88	3.27	−0.97	−0.35	0.76	1.72	
Covariance										
Management priority (MP)	0.95									
Organizational communication (OC)	0.80	0.87								
Organizational participation (OP)	0.81	0.89	0.85							

<sup>1</sup> For the CFA, all standardized factor loadings with numbers listed and covariances were significant at the  $p < 0.01$  level. A blank indicates that there was no path from a factor to an item (i.e., zero factor loading), as hypothetically defined in the model. <sup>2</sup> For the IRT analysis, generalized partial credit model was used.

Table 4 shows Spearman's rank correlation coefficients of the PSC-12J (and its subscales) with other variables of interest. For job demands, psychological demands and emotional demands showed small-to-medium negative correlations with the PSC-12J. Physical demands also showed a negative correlation with the PSC-12J whilst it was relatively small. For job resources, decision authority and skill discretion showed small-to-medium positive correlations; extrinsic reward, supervisor support, and coworker support showed medium-to-large positive correlations with the PSC-12J. For negative outcome measures, psychological distress and emotional exhaustion showed small-to-medium negative correlations with the PSC-12J. For positive outcome measures, self-rated health showed small-to-medium positive correlations; work engagement and job satisfaction showed medium-to-large positive correlations with the PSC-12J. Similar tendencies were observed for the subscales (RoB Box 9-3).

**Table 4.** Spearman's rank correlation coefficients of the PSC-12J and its subscales with other relevant variables ( $N = 2200$ )<sup>1</sup>.

	PSC-12J (Total)	PSC-12J Subscales			
		MC	MP	OC	OP
PSC-12J subscales					
Management commitment (MC)	0.91				
Management priority (MP)	0.92	0.85			
Organizational communication (OC)	0.90	0.76	0.77		
Organizational participation (OP)	0.90	0.76	0.78	0.80	
Relevant variables (job demands and resources)					
Psychological demands	−0.14	−0.12	−0.16	−0.13	−0.13
Physical demands	−0.09	−0.07	−0.10	−0.07	−0.08
Emotional demands	−0.21	−0.20	−0.20	−0.20	−0.19
Decision authority	0.25	0.23	0.25	0.25	0.23
Skill discretion	0.27	0.23	0.24	0.25	0.27
Extrinsic reward	0.47	0.41	0.43	0.47	0.42
Supervisor support	0.58	0.50	0.52	0.61	0.51
Coworker support	0.45	0.40	0.41	0.46	0.40
Relevant variables (outcomes)					
Psychological distress	−0.25	−0.22	−0.25	−0.24	−0.20
Emotional exhaustion	−0.24	−0.21	−0.24	−0.22	−0.21
Self-rated health	0.21	0.19	0.19	0.22	0.18
Work engagement	0.38	0.34	0.35	0.38	0.34
Job satisfaction	0.38	0.34	0.35	0.39	0.33

<sup>1</sup> All coefficients are significant at the  $p < 0.01$  level.

Table 5 shows the comparison of the mean ranks of the PSC-12J and its subscales by demographic characteristics. The results of the Kruskal–Wallis test showed that there were significant group differences in the mean ranks of the PSC-12J for sex, education, and occupation. More specifically, men, those with higher education (i.e., college graduate or higher), and managers had higher mean ranks compared to the counterparts. On the other hand, a significant group difference in the mean ranks of the PSC-12J was not observed for age. With two exceptions (i.e., a significant group difference in the mean ranks of the MC and OC for age), similar tendencies were observed for subscales (RoB Box 9-6).

**Table 5.** Comparison of the mean ranks of the PSC-12J and its subscales by demographic characteristics (Kruskal–Wallis test) ( $N = 2200$ ).

	PSC-12J (Total)		PSC-12J Subscales <sup>1</sup>							
			MC		MP		OC		OP	
	Mean Rank	<i>p</i> Value	Mean Rank	<i>p</i> Value	Mean Rank	<i>p</i> Value	Mean Rank	<i>p</i> Value	Mean Rank	<i>p</i> Value
<b>Sex</b>		0.005		0.034		0.028		0.028		<0.001
Men ( $n = 1100$ )	1138.15		1128.93		1129.91		1129.99		1151.24	
Women ( $n = 1100$ )	1062.85		1072.07		1071.09		1071.01		1049.76	
<b>Age</b>		0.062		0.046		0.054		0.024		0.141
20–29 years old ( $n = 440$ )	1134.12		1131.88		1125.45		1155.62		1135.65	



Table 5. Cont.

	PSC-12J (Total)		PSC-12J Subscales <sup>1</sup>							
	Mean Rank	p Value	MC		MP		OC		OP	
			Mean Rank	p Value	Mean Rank	p Value	Mean Rank	p Value	Mean Rank	p Value
30–39 years old (n = 440)	1083.18		1077.77		1062.04		1114.42		1086.29	
40–49 years old (n = 440)	1034.81		1037.57		1049.41		1021.88		1040.34	
50–59 years old (n = 440)	1100.43		1098.19		1105.05		1087.43		1107.50	
60–69 years old (n = 440)	1149.96		1157.09		1160.55		1123.15		1132.72	
<b>Education</b>		<0.001		<0.001		<0.001		<0.001		<0.001
Graduate school (n = 126)	1142.73		1154.60		1133.73		1129.81		1172.40	
College (n = 1054)	1174.23		1153.43		1164.36		1174.79		1168.28	
Junior college (n = 491)	1033.29		1051.75		1057.24		1034.70		1017.29	
High school/ Junior high school (n = 529)	1005.92		1027.39		1005.50		1006.58		1025.56	
<b>Occupation</b>		<0.001		<0.001		<0.001		<0.001		<0.001
Manager (n = 249)	1343.94		1346.22		1351.31		1288.39		1314.60	
Non-manual (n = 1508)	1086.56		1080.60		1087.17		1091.65		1089.72	
Manual (n = 294)	1018.21		1021.67		1006.18		1042.48		1031.85	
Others (n = 149)	997.16		1046.85		1002.35		990.60		987.33	

<sup>1</sup> MC = management commitment; MP = management priority; OC = organizational communication; OP = organizational participation.

In summary, the PSC-12J showed excellent psychometric qualities, suggesting that the Japanese translation is an accurate and reliable reflection of the PSC construct in a Japanese context.

#### 4. Discussion

In the present study, the English version of the PSC-12 was translated into Japanese, and the reliability and validity of the PSC-12J were examined in a general working population in Japan. The PSC-12J and its subscales showed a high internal consistency and moderate test–retest reliability. The factor structure, correlations with other relevant psychosocial work environments and health-related outcomes, and the distribution of scores by demographic characteristics were also observed to be in the theoretically expected directions.

Specifically, the PSC-12J and its subscales had Cronbach’s alpha coefficients of >0.90, indicating a high internal consistency. These coefficients are similar to or higher than those reported in the previous study in Australia [8]; therefore, the new PSC-12J seems to have a level of reliability that is comparable to the original English version. Furthermore, it showed a moderate test–retest reliability (Cohen’s weighted kappa = 0.53 and ICC = 0.69), which was similar to the result of a previous study reported in Australia with a 12-month interval [42]. There is ongoing discussion in the literature about how stable climate factors should be expected to act over time, with some experts suggesting that a fluctuation can be expected, whilst others claim that climate endures in an organization (especially when disenfranchised employees or toxic workplace behaviors persist). In the online survey conducted in the present study, PSC was asked first in both the baseline and follow-up

surveys. In addition, considering that the interval between the surveys was only two weeks, the moderate test–retest reliability observed in the present study is unlikely to be due to a lack of attention when answering the PSC-12J, but rather due to a certain factor causing PSC to fluctuate between the surveys. For example, some of the managers who participated in the present study may have been inspired by the PSC-12J items and started working on improving their PSC immediately after the baseline survey. Another possibility is that some participants may have become more aware of psychosocial risks and hazards due to answering questions about PSC in the baseline survey, and their response patterns to the PSC-12J may have changed in the follow-up survey. There is also a dearth of research on PSC over very short time intervals, so the potential for PSC to fluctuate over the course of two weeks is still unknown. Together, all of these factors may have affected the test–retest reliability. Therefore, whilst our findings suggest that the PSC-12J has a certain level of reproducibility, the temporal stability of PSC needs further detailed discussions, including international comparisons.

The results of CFA based on the originally assumed four-factor structure showed an acceptable model fit. The fit indices are similar to or better than those reported in the previous study in Australia [8], indicating that the PSC-12J has a similar factor structure to the original English version and they are comparable to each other. Furthermore, the IRT analysis showed that all items had a sufficient discrimination and appropriate difficulty, suggesting that the items comprising the subscales of the PSC-12J are sensitive in identifying PSC and are suitable for measuring PSC in Japanese workplaces.

The results of the correlations of the PSC-12J and its subscales with the relevant psychosocial work environment and health-related outcomes were generally in line with the hypotheses and consistent with the previous study in Australia [8]. The only exception was that in our study, the correlation coefficient of the PSC-12J with coworker support was much greater than in the previous study in Australia (0.45 and 0.17, respectively). Compared to Western countries, Japanese workplaces are characterized by not only a more collectivistic approach among coworkers, but also a hierarchy oriented between senpai and kōhai (which refers to the social dynamics of a senior–junior relationship) [43]; therefore, policies that are established and implemented to protect psychological health and safety among employees may be more likely to have an impact on the relationships among coworkers in Japanese workplaces compared to Australian (or similar Western) workplaces. Further cross-cultural research on the association of PSC with various kinds of relevant variables is needed.

The results of the Kruskal–Wallis test showed that there were significant group differences in the mean ranks of the PSC-12J for sex, education, and occupation. Particularly, men, those with higher education, and managers had higher mean ranks compared to their counterparts. Although known-group validity was not examined or reported in the previous study in Australia [8], our findings are reasonable since Japanese workplaces have a male-oriented culture (i.e., the participation of women in the important decision-making process has yet to be promoted) [40]; people with higher education are reported to be more likely to have a job in a more resourceful work environment [41]; and people in managerial positions are directly involved in the construction of the PSC. People with such demographic characteristics may have been more likely to more highly rate the PSC of their own workplace. Our findings suggest that the Japanese version of the PSC-12 has a certain level of known-group validity.

Possible limitations of the present study should be considered. First, the present study was conducted among registrants of one particular private online survey company. Our study sample may be more likely to be healthy individuals who are satisfied with their circumstances (i.e., less likely to be overworked, bullied, depressed, or dissatisfied with their jobs). On the other hand, it is also possible that our study sample included individuals who were in need and participated in the survey to obtain incentives. Therefore, the mean scores of the PSC-12J and its subscales shown in Table 2 are only preliminary and generalizability should be made with caution. Further research using recruitment strategies

that account for non-Internet users should be conducted to calculate mean scores that are more generalizable to Japan as a whole. Second, in the present study, the PSC-12J showed a high internal consistency, but the Cronbach's alpha coefficient was over 0.90, indicating that there may be a redundancy in the scale items. Third, some of the relevant variables used to examine convergent validity (e.g., physical demands) were measured with single-item scales. Because single-item scales have a low content validity and sensitivity, and internal consistency cannot be calculated, and it is possible that the true association with the PSC-12J was masked. In the future, it is necessary to confirm whether the association found in the present study can be replicated using a multi-item scale with a confirmed reliability and validity. Lastly, some important properties of the scale, such as cross-cultural validity (RoB Box 5), criterion validity (RoB Box 8), and responsiveness (RoB Box 10), were not examined in the present study, and such properties should be examined in the future.

Nevertheless, we cannot understate the notable strengths of the present study. First, we base our analysis on a very large sample of the general community (stratified to account for sex and age brackets), and used matched data for the same people over time. Next, the reliability and validity results were based on extensive testing via different metrics; therefore, we could be confident the PSC-12J tapped into the same fundamental construct that was measured in Western countries. Lastly, the thorough back-translation process and the IRT analysis were a commitment that very few research measures engaged in when translating a scale into a different language, a first for PSC-12 translation, and we can be confident that the PSC-12J is a robust reflection of the psychosocial safety climate in a Japanese context, accounting for the subtleties in language and culture.

Future research could explore the psychometrics of the PSC-12J short form; since the internal consistency of the PSC-12J was so high, this implies some redundancy. For example, a single-item measure of each of the four domains (i.e., a PSC-4J) could present a reliable way of measuring PSC whilst balancing the practicalities of reducing participant burden [42,44]. Given that the PSC construct refers to a shared perception, the reliability and validity of the measure could be explored further using multilevel modelling and CFA. Grouping data by organization was not possible in the current population study across numerous organizations.

## 5. Conclusions

Our findings provided evidence that the PSC-12J is reliable, valid, and a comparable measure to the established English version. Although more detailed validity needs to be examined in the future, we hope that the PSC-12J will be a useful instrument for assessing PSC in Japanese workplaces, and by extension can further lead the charge for primary prevention and intervention research [45] for improved psychological health among Japanese employees.

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**Institutional Review Board Statement:** The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Kitasato University Medical Ethics Organization (protocol code: B20-180, date of approval: 15 September 2020).

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The data presented in this study are not publicly available but are available from the corresponding author on reasonable request.

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# Organizational Justice and Cognitive Failures in Japanese Employees

## A Cross-Sectional Study

Akiomi Inoue, PhD, Hisashi Eguchi, MD, Yuko Kachi, PhD, and Akizumi Tsutsumi, MD

**Objective:** We examined the association of organizational justice (ie, procedural justice and interactional justice) with cognitive failures, and the mediation effect of psychological distress on this association in Japanese employees. **Methods:** A total of 189 men and 35 women from two sites of a manufacturing company in Japan were surveyed using a self-administered web-based questionnaire. A multiple mediation analysis was conducted. **Results:** A significant negative total effect of procedural justice on cognitive failures was observed ( $c = -0.180$  [95% confidence interval:  $-0.315$  to  $-0.044$ ]). Furthermore, the mediation effect of psychological distress was significant ( $c' = -0.213$  [95% confidence interval:  $-0.323$  to  $-0.115$ ]). Similar patterns were observed for interactional justice. **Conclusions:** Employees may be more likely to experience cognitive failures in daily activities in work settings where organizational justice is lower, which seems to be explained by psychological distress.

**Keywords:** caseness, distractibility, fairness, false triggering, forgetfulness, indirect effect

With the aging of the workforce, increasingly more occupational health research is focusing on cognitive function among employees.<sup>1</sup> In particular, cognitive decline (or cognitive impairment) has adverse impacts on both companies and employees, such as lower productivity and occupational injury.<sup>2–4</sup> At the same time, it has also been reported that cognitive decline is reversible if it is in an early stage<sup>5</sup>; therefore occupational health research has examined the association of psychosocial working conditions with cognitive function to explore a possible contribution of a better work organization for the prevention of cognitive decline.<sup>1</sup> According to systematic reviews on the prospective association of psychosocial working conditions with cognitive

function,<sup>6,7</sup> low job control<sup>8,9</sup> and long working hours<sup>10</sup> were associated with lower levels of cognitive function, while mental work demands (including intellectual demands and cognitive stimulation at work),<sup>11–15</sup> active job (ie, the combination of high job demands and high job control),<sup>9,16</sup> and work complexity<sup>17,18</sup> had protective effects on cognitive decline.

In addition, organizational justice has also been considered as a psychosocial working condition that has an impact on cognitive function among employees.<sup>6</sup> Particularly in occupational health research, procedural justice (ie, the fairness of formal decision-making procedures, such as dispute resolution and resource allocation)<sup>19,20</sup> and interactional justice (ie, the extent to which supervisors treat their subordinates with respect and dignity and provide a rationale for their decisions)<sup>21</sup> have been viewed as primary characteristics of organizational justice within a workplace.<sup>22</sup> To date, one prospective study has examined the association of organizational justice (mainly interactional justice) with cognitive function and revealed that low organizational justice had an impact on cognitive decline.<sup>23</sup>

All of the previous studies on the association of psychosocial working conditions with cognitive function introduced above measured cognitive function using neuropsychological testing; however, in the field of occupational health practice, where caseness as well as illness is important,<sup>24</sup> it is necessary to focus not only on cognitive decline but also on the behavioral problems that arise from such decline in the “real world.” We therefore focused on cognitive failures, which can be defined as cognitive-based errors resulting from problems with memory, attention, or action, occurring in a simple task that a person should normally perform without mistakes.<sup>25</sup> To date, two studies have examined the association of psychosocial work conditions (eg, task-related stressors, job control, role clarity, and insecurity at work) with cognitive failures.<sup>26,27</sup> However, these studies were conducted with nurses in the context of patient safety, limiting the generalizability of the results, and did not examine the association of organizational justice with cognitive failures.

Furthermore, there is a growing interest in the pathways linking psychosocial working conditions and cognitive function.<sup>28</sup> Specifically, Elovainio et al<sup>23</sup> argued that a potential pathway linking organizational justice and cognitive function may include psychological distress. In fact, previous studies reported that low organizational justice was prospectively associated with poor mental health including psychological distress<sup>29–35</sup> and that psychological distress affected multiple memory systems and learning strategies as well as the encoding/retrieval of words.<sup>36,37</sup> To our knowledge, however, the mediation effect of psychological distress on the association of organizational justice with cognitive function or cognitive failures has not been previously examined.

The purpose of the present study was twofold. The first aim was to examine the association of organizational justice (ie, procedural justice and interactional justice) with cognitive failures. The second aim was to examine the mediation effect of psychological distress on this association. We hypothesized that organizational justice would be negatively associated with cognitive failures, mediated (or explained) by psychological distress.

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The study purposes and procedures were explained to the employees, and online informed consent was obtained from them prior to study initiation. Kitasato University Medical Ethics Organization reviewed and approved the aims and procedures of the present study (No. B18-047).

The authors report no conflicts of interest.

**Clinical significance:** Our findings suggest that employees are more likely to experience cognitive failures in daily activities in work settings where organizational justice is lower, which seems to be explained by psychological distress. Improvements in organizational justice may contribute to a decrease in cognitive failures through a reduction in psychological distress.

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