

Article

Factors associated with blue-collar workers' participation in Worksite Health Promotion Programs: a scoping literature review

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Abstract

A growing number of employers implement worksite health promotion programs (WHPPs). In particular, blue-collar workers may benefit from these WHPPs. However, they are less likely than other workers to participate and little is known about which factors affect their participation. The aim of this scoping literature review is to produce an overview of studies on factors associated with blue-collar workers' participation in WHPPs. Five databases were searched: BSU, PsycINFO, Medline, Web of Science and CINAHL. The review included peer-reviewed empirical studies on determinants associated with blue-collar workers' participation in WHPPs. Factors were extracted and categorized. Similar determinants were clustered and the direction of the associations was further examined. Nineteen papers describing 11 qualitative and 4 quantitative studies met the eligibility criteria. Seventy-seven determinants were analyzed (in quantitative studies) or reported (in qualitative studies). In most studies, only participant characteristics were investigated. Participation may be enhanced by addressing needs, tailoring from a broad range of activities, offering group activities, requiring little effort and commitment at the start, using incentives, leading by example and combining WHPPs with occupational safety interventions. WHPPs seem to be able to reach blue-collar workers, but it remains particularly challenging to reach shift workers and those who do not yet experience health complaints.

Keywords: participation, program evaluation, implementation, worksite, prevention,

BACKGROUND

A healthy lifestyle enhances work productivity, reduces sick leave and prevents work incapacity (O'Donnell and Schultz, 2017; van der Mark-Reeuwijk *et al.*, 2019). Therefore, a growing number of employers implement worksite health promotion programs (WHPPs) (O'Donnell and Schultz, 2017). WHPPs are 'employer initiatives directed at improving the health

and well-being of workers' (Goetzel and Ozminkowski, 2008, p. 304).

In particular, workers in blue-collar jobs may benefit from WHPPs, since their life expectancy is generally lower than that of white-collar workers (Katikireddi *et al.*, 2017; Deeg *et al.*, 2021), and they report more severe physical health complaints and lower work ability (Schreuder *et al.*, 2008; van den Borre and Deboosere, 2018). In Western countries, labor shortages are more

Contribution to Health Promotion

- Blue-collar workers have more health problems than other workers, but they are less likely to participate in worksite health promotion programs;
- Low participation levels decrease the impact these interventions could have and little is known about which factors affect blue-collar workers' participation;
- This scoping review presents an overview of studies in which factors were investigated that may influence their participation;
- Several pathways to enhance participation levels are discussed in the article, such as offering rewards, leading by example and combining health programs with safety interventions.

pronounced in blue-collar work than in white-collar work, due to the retirement of baby boomers and a more educated younger workforce (Levanon *et al.*, 2021). Thus, investment in blue-collar workers' health is necessary not only to reduce socio-economic health differences but also to keep the current workforce sustainably employed.

Previous studies have found that unhealthy lifestyle behaviors appear to be more prevalent among blue-collar workers (Kelly *et al.*, 2012; Väisänen *et al.*, 2020). For example, in the USA, construction workers and installation workers are estimated twice as likely to be currently using tobacco than workers in health care or education (Syamlal *et al.*, 2017), and long-haul truck drivers are twice as likely to be obese and current smoker than the average worker (Sieber *et al.*, 2014). Moreover, these behaviors appear to mediate between occupation and several health outcomes, such as metabolic syndrome and incident cardiovascular disease, in addition to work-related factors (Petrovic *et al.*, 2018; Runge *et al.*, 2021; Väisänen *et al.*, 2022). WHPPs have been found to significantly improve blue-collar workers' lifestyles and short-term health outcomes (Ng *et al.*, 2015; Crane *et al.*, 2021), which may improve their health and work ability.

At the end of the 20th century, WHPPs evolved from single-behavior interventions aimed at preventing illness to broader programs promoting wellness (Reardon, 1998; Cordia *et al.*, 2000; Robroek *et al.*, 2021). Increasingly, they were offered to employees of all levels instead of just upper management (Sparling, 2010). However, Glasgow *et al.* (Glasgow *et al.*, 1993) concluded that blue-collar workers were less likely to participate in WHPPs than white-collar workers. Since then, studies have confirmed that blue-collar workers

participate less often than other workers [e.g. (Toker *et al.*, 2015; Tsai *et al.*, 2019)]. Several authors have stressed the importance of studying factors that hinder or facilitate participation in WHPPs (Linnan and Steckler, 2002; Robroek *et al.*, 2009; Wierenga *et al.*, 2013). In particular, more knowledge is needed on how to reach blue-collar workers (Robroek *et al.*, 2021).

Based on several theoretical frameworks, Wierenga *et al.* (Wierenga *et al.*, 2013) identified five groups of contextual factors that may influence participation levels: characteristics of the socio-political context, the organization, the implementer, the intervention program and the participant. Implementation strategies can moderate the influence of these contextual factors on the implementation process. This framework has been used in reviews to categorize implementation factors [e.g. (Wierenga *et al.*, 2013; Grøningsæter and Kiland, 2022)].

The objective of this scoping literature review is to produce an overview of studies that examine factors associated with blue-collar workers' participation in WHPPs. The three research questions are: (i) which factors associated with blue-collar workers' participation in WHPPs are measured? (ii) what methods are used to study these factors? (iii) which contextual factors and implementation strategies are associated with blue-collar workers' participation in WHPPs?

METHODS

This study was conducted using the methodological framework for scoping reviews developed by Arksey and O'Malley (Arksey and O'Malley, 2005). The authors describe five stages in conducting a scoping review: identifying the research question, identifying relevant studies, selecting studies, charting the data, and collating, summarizing and reporting the results. Furthermore, the Prisma-ScR checklist (Tricco *et al.*, 2018) was used to report all items relevant to scoping reviews (see [Supplementary Appendix A](#)).

Identifying relevant studies

The research team and two health research information specialists jointly developed a search string to find relevant studies. Five databases were searched (BSU, PsycINFO, Medline, Web of Science and CINAHL) and search terms were used in different combinations so each combination contained at least these five constructs: work, health/lifestyle, intervention, blue-collar and participation. For example, WHPP (work, health/lifestyle and intervention) AND income level (blue-collar) AND participation (participation). Another example is coaching (intervention) AND nutrition (health/lifestyle) AND truck drivers (work, blue-collar) AND barrier* (participation) (for an example search string

see [Supplementary Appendix B](#)). In addition, bibliographies of relevant studies were checked for other relevant studies.

Study selection

The search was conducted in December 2019, with search updates, performed in the same way as the initial search, in February 2021 and February 2022. Abstracts were uploaded in Rayyan ([Ouzzani et al., 2016](#)). Two reviewers (MD and SD) screened the titles and abstracts to exclude irrelevant records. They then retrieved full texts of the relevant records.

Five reviewers (MD, SD, SR, JE and AdL) screened the full texts for studies meeting the following criteria:

- (1) peer-reviewed empirical studies;
- (2) written in English;
- (3) published after 2000;
- (4) blue-collar workers are part of the target group;
- (5) the aim of the WHPP is to promote a healthy lifestyle (i.e. it addresses nutrition, smoking, alcohol or drugs, physical activity and/or relaxation) and/or assess health or lifestyle via a Health Risk Assessment (HRA);
- (6) participation in the WHPP activities is voluntary (e.g. lifestyle coaching, group activities, educational materials or health checks);
- (7) the program connects to the workplace (e.g. provided by an employer/union or via the workplace);
- (8) the study includes a qualitative or quantitative analysis of factors associated with participation, non-participation and/or drop-out of blue-collar workers; and
- (9) The study describes data collection and analysis methods as well as results.

The assessment of whether people belong to the group of blue-collar workers was based on the International Standard Classification of Occupations (ISCO) ([International Labour Organization, 2012](#)). Occupations with ISCO codes 6, 7, 8 or 9 were categorized as blue-collar.

Although WHPPs may address all aspects of health, studies were only included if they were at least partly aimed at enhancing a healthy lifestyle among the target group, or provided a general HRA. Excluded were purely ergonomic WHPPs, WHPPs aimed at safety behavior, sexual behavior, hygienic behavior or protecting the skin and WHPPs in which employees were required to participate (e.g. environmental WHPPs). Excluded were studies on factors associated with the intention to participate, such as needs assessments.

Also excluded were process evaluations that included reasons for non-participation or drop-out without describing how data were collected or analyzed. Other than a description of the data collection, method of analysis and results, no further conditions were set regarding study quality.

To test the selection protocol, Fleiss' Kappa was calculated and showed fair agreement between reviewers ($\kappa = 0.255, p > 0.05$). Differences were discussed in the research team and agreement was reached on how to interpret the criteria. Discussion results were used to strengthen the selection protocol (see [Supplementary Appendix C](#)). A second interrater reliability calculation after this calibration session resulted in perfect agreement ($\kappa = 1.000, p < 0.01$).

Charting the data

After the studies were selected, the reviewers used an extraction protocol (see [Supplementary Appendix C](#)) to chart the data from those studies. The extraction was done in Microsoft Excel (version 2211), using an extraction matrix with these fields: author, year, journal, country, target of the WHPP, type of WHPP, target group, study type, data collection method, analysis type, outcome, participation levels, factors studied and a descriptive summary of the findings needed to synthesize the data (see [Supplementary Appendix D](#)).

Collating and summarizing the data

Two reviewers (MD and SD) categorized the findings regarding factors associated with participation. First, they distinguished between factors associated with initial participation (e.g. registration, showing up at baseline or first session) and factors associated with continued participation (e.g. attending more sessions or showing up at follow-up). Then, they categorized the findings using the groups of factors from Wierenga's framework ([Wierenga et al., 2013](#)): characteristics of the socio-political context, the organization, the implementer, the intervention program, the participant and the implementation strategy.

After categorization, similar factors were clustered and the direction of the factor was set. 'Positive' or 'negative' was used when a significant positive or negative association between the factor and participation was found in quantitative studies or when the factor was reported as an enhancer (positive) of, or barrier (negative) to participation in qualitative studies. 'No significant effect' was used when no significant association was found between factor and participation in quantitative studies, or when an association that was found, disappeared after multivariate analysis. Categorization and clustering were discussed in the research team and agreed upon by all reviewers.

RESULTS

Search results

The database search resulted in 8011 records. After removing duplicates, screening titles and abstracts, and screening the bibliographies of relevant papers, 592 papers were selected for full-text assessment. After this assessment, 19 papers describing 15 studies remained for data extraction and analysis. The flow of papers is presented in [Figure 1](#).

Study characteristics

An overview of the included studies is presented in [Table 1](#).

Most included studies targeted blue-collar workers in transportation ($n = 6$) and construction ($n = 3$). The other target groups were cleaners ($n = 2$), factory workers ($n = 2$), fire fighters ($n = 1$) and blue-collar workers in general ($n = 1$).

Physical activity was the most targeted behavior in the included studies ($n = 10$), followed by nutrition ($n = 8$). Physical activity and nutrition were the most common combination of targeted behaviors ($n = 3$). Group activities ($n = 6$), educational materials ($n = 4$), coaching or counseling ($n = 4$) and product supply (e.g. free fruit or a gym membership; $n = 4$) were the most common types of intervention.

Outcomes were focused on either initial participation ($n = 7$), continued participation ($n = 1$) or participation in general ($n = 7$). Initial participation levels

varied from 9 to 61% with a median of 46% ($n = 8$). Continued participation levels varied from 52 to 90% with a median of 69% ($n = 3$) (see [Supplementary Appendix E](#) for a tabulated summary of study findings).

Which factors associated with blue-collar workers' participation in WHPPs are measured?

Quantitative studies ($n = 4$) primarily focused on the association between participant characteristics and participation. Demographic factors were most frequently studied. For example, the association between age and participation, was included in all four quantitative studies. Job-related factors included job seniority, shift work and exposure to health risks on the job. Health and lifestyle factors included health complaints, diagnosed illnesses, smoking status and leisure time physical activity. Furthermore, psychological determinants, such as intention to change and self-efficacy were included in some studies ($n = 2$). Besides participant characteristics, only two factors related to the organization level were included in the quantitative studies: social support by supervisor and social support by co-workers ([Sorensen et al., 2009](#)).

In most qualitative studies, enhancers of and/or barriers to participation were studied in general without studying the influence of specific categories or factors. In some of the studies, individuals were asked specifically about their attitudes towards WHPPs ([Sendall et al., 2017](#)), their

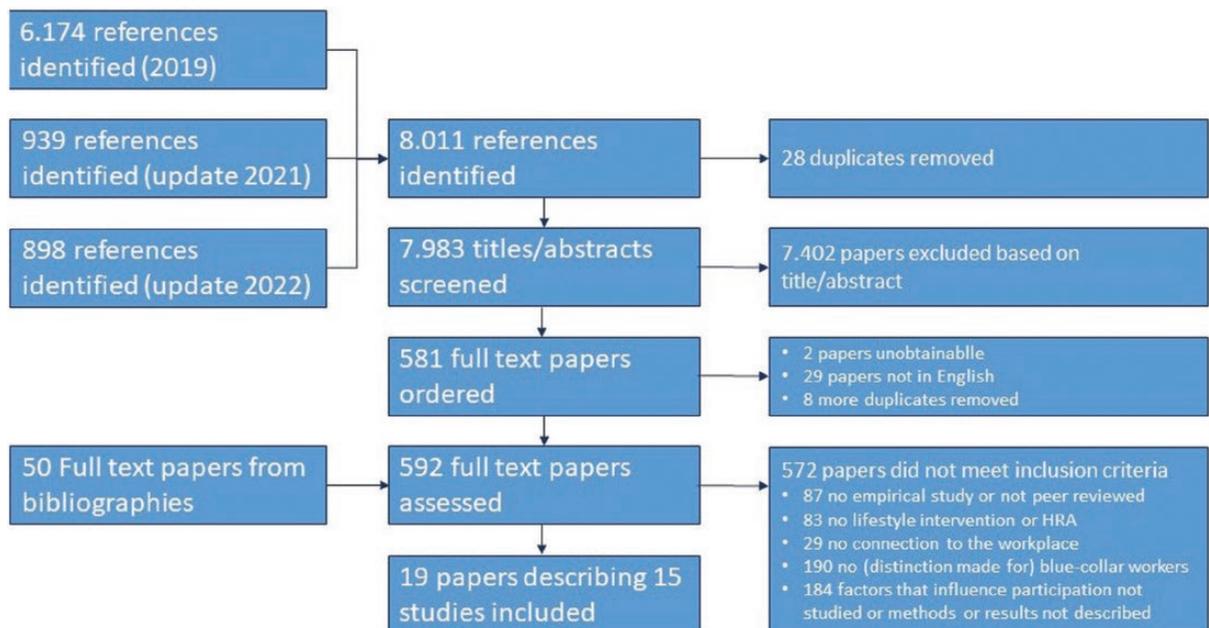


Fig. 1: Flow of papers.

Table 1: Extraction included studies

Authors (year)	Country	Target group	Target of the intervention	Type of intervention	Outcome and participation levels	Data collection method (for factors that influence participation)	Type of analysis	Theoretical framework or model used for studying participation	Studied factors
Quantitative studies									
Korshøj <i>et al.</i> (2016); Lidegaard <i>et al.</i> (2018)	Denmark	Cleaners	Physical activity	Aerobics exercise group	Initial participation (consenters, 137/250 = 55%)	Survey (baseline) (N = 241/250 = 96%)	Student's <i>t</i> -test and Pearson's chi for differences between consenters and non-consenters (N = 241)	Not mentioned	<i>Characteristics of the participant:</i> gender, age, height, weight, country of birth, job seniority, occupational and leisure time physical activity, diagnosed illnesses, musculoskeletal disorders
Hunt <i>et al.</i> (2009)	USA	Construction laborers	Nutrition and smoking	Telephone counseling and educational materials	Initial participation (consenters, 673/1108 = 61%)	Survey (baseline) (N = 760/1108 = 69%)	Multiple logistic regression analysis between factors and initial participation (N = 760)	Not mentioned (although the transtheoretical model was used to operationalize 'intention')	<i>Characteristics of the participant:</i> cigarette use, nicotine addiction, intention to quit smoking, self-efficacy for quitting smoking, fruit and vegetable (F&V) consumption, intention to change F&V consumption, self-efficacy for changing F&V consumption, shift work, job strain, managerial status, union reliable source of information, proud to say I am a union member, union is concerned about health and safety, identification with union's problems, race/ethnicity, education, income, native language, chemical exposure on the job, age
Jørgensen <i>et al.</i> (2010); Rasmussen <i>et al.</i> (2012)	Denmark	Cleaners	Physical activity and HRA	Physical coordination training, cognitive behavioral theory-based training or HRA	Initial participation (consented, completed testing and allocated to group) 363/758 = 48%) Continued participation (>30% attendance) calculated for Danish and non-western participants (171/332 = 52%)	Survey (baseline) (N = 573/758 = 76%)	Binary logistic regression between country of birth and initial and continued participation (N = 332), student's <i>t</i> -test, Pearson's chi and Mann-Whitney test to test differences for other factors between initial participation and non-participation (N = 573)	Not mentioned	<i>Characteristics of the participant:</i> age, gender, body mass index (BMI), job seniority, working hours, leisure time physical activity, musculoskeletal, cardiovascular and respiratory diseases, musculoskeletal symptoms (Jørgensen <i>et al.</i> , 2010), country of birth (Rasmussen <i>et al.</i> , 2012)

Table 1. Continued

Authors (year)	Country	Target group	Target of the intervention	Type of intervention	Outcome and participation levels	Data collection method (for factors that influence participation)	Type of analysis	Theoretical framework or model used for studying participation	Studied factors
Sorensen <i>et al.</i> (2009); Sorensen <i>et al.</i> (2010)	USA	Motor freight workers	Nutrition and smoking	Telephone counseling, tailored feedback report and targeted written educational materials	Initial participation calculated for tobacco users (completing one or more counseling calls, 227/541 = 42%)	Survey (baseline) (N = 542/697 = 78%)	Multiple logistic regression (N = 144) between factors and initial participation (Sorensen <i>et al.</i> , 2009) and mixed-effect linear modeling method between factors and initial participation (Sorensen <i>et al.</i> , 2010)	Social contextual model of health behavior change	<i>Organization characteristics:</i> supervisory support (general) (Sorensen <i>et al.</i> , 2009, 2010), co-worker support for quitting smoking (Sorensen <i>et al.</i> , 2009) <i>Characteristics of the participant:</i> amount smoked, intention to quit, functional meaning of tobacco use, negative social consequences of tobacco use, concern about exposures on the job, gender, marital, status (Sorensen <i>et al.</i> , 2009). Tobacco use, job satisfaction, adequate sleep, job strain, work shift, age, education, race/ethnicity, job type (Sorensen <i>et al.</i> , 2009, 2010) Money situation, hours worked, F&V consumption, sugary drinks consumption, sugary snacks consumption, weight, BMI (Sorensen <i>et al.</i> , 2010)
Qualitative studies									
Podlog and Dionigi (2009)	Australia	Blue-collar factory workers	Physical activity	Exercise group	Continued participation (no participation levels given)	2 focus group with participants (N = 10), 7 completers and 3 drop-outs	Constant comparative method	Self-determination theory	<i>Enhancers and barriers (general)</i>
Sendall <i>et al.</i> (2018)	Australia	Truck drivers	Physical activity and nutrition	Social media messages	Participation in general (no participation levels given)	Interviews and focus group with workplace managers (N = 5), truck drivers, both participants and non-participants (N = 10)	Thematic coding	Not mentioned	<i>Enhancers and barriers (general)</i>

Table 1. Continued

Authors (year)	Country	Target group	Target of the intervention	Type of intervention	Outcome and participation levels	Data collection method (for factors that influence participation)	Type of analysis	Theoretical framework or model used for studying participation	Studied factors
<i>Sendall et al.</i> (2021)	Australia	Truck drivers	Physical activity and nutrition	3 or 4 of the following 7 interventions: posters, healthy options vending machine, free fruit, step challenge, toolbox talks, health messages, Facebook page	Participation in general (no participation levels given)	Interviews and focus groups with workplace managers (N = 6) and truck drivers (N = 30*), surveys (N = 68)	Thematic coding, framework analysis	Angelo framework	<i>Characteristics of the participant:</i> experiences, attitudes and values about workplace health promotion <i>Enhancers and barriers (general)</i>
<i>Varela-Mato et al.</i> (2018)	UK	Lorry drivers	Physical activity and nutrition	Health assessments, counseling, 6-hour education workshop, health coaching, cab workout, step count challenges and healthy packed lunches	Initial participation (63/136 = 46%) Continued participation (engagement, 57/63 = 90%)	Interviews and focus group with lorry drivers, all participants (N = 16), transport managers (N = 4), transport planner (N = 1), observations and reflections	Thematic coding	Not mentioned	<i>Enhancers and barriers (general)</i>
<i>Boschman et al.</i> (2013)	Netherlands	Brick layers and supervisors	HRA	Questionnaire, biometry measurements and consult	Initial participation (77/899 = 9%)	Interviews with occupational health professionals (N = 11)	Content sorting	Not mentioned	<i>Enhancers and barriers (general)</i>
<i>Mayer et al.</i> (2013)	USA	Full-time, active-duty fire fighters	Physical activity	Exercise therapy program	Initial participation (153/573 = 27%) Continued participation (adherence) (on average 56.5/84 = 67% of sessions attended)	Focus group with fire fighters, all participants (N = 27)	Framework analysis	Social ecological framework	<i>Characteristics of the participant:</i> reasons for participation; <i>enhancers and barriers (general)</i>

Table 1. Continued

Authors (year)	Country	Target group	Target of the intervention	Type of intervention	Outcome and participation levels	Data collection method (for factors that influence participation)	Type of analysis	Theoretical framework or model used for studying participation	Studied factors
Wong <i>et al.</i> (2014)	Australia	Bus drivers	Physical activity	Walking club and corporate membership, deal with a local gym	Initial participation (no clear participation levels given)	Interviews with bus drivers, all participants (N = 28) and managers (N = 6)	Generic qualitative analysis	Not mentioned	<i>Characteristics of the organization and WHPP; workplace opportunities for participation; implementation strategies to promote participation</i>
Lingard and Turner (2015)	Australia	Construction workers	Physical activity, nutrition, smoking and alcohol	Workplaces for wellness program, interventions not specified but included yoga, food tasting and stretching sessions and a fresh fruit stall	Initial and continued participation (no participation levels given)	Participatory action research, interviews with construction workers (N = 12)	Content analysis	Not mentioned	<i>Enhancers and barriers (general)</i>
Sorensen <i>et al.</i> (2017)	India	Factory workers	Nutrition and smoking	Health education	Initial participation (no participation levels given)	Interviews with program officers (N = 2), 4 focus groups with production workers (after pilot intervention)	Thematic coding	Not mentioned	<i>Enhancers and barriers (general)</i>
Cunradi <i>et al.</i> (2015)	USA	Transit workers	Smoking	Health maintenance organization-based smoking cessation support programs and activities	Initial participation (no participation levels given)	11 focus groups with transit workers (N = 71)	Thematic coding	Not mentioned	<i>Barriers (general)</i>
McMahan <i>et al.</i> (2002)	Ireland	Blue-collar workers in general	Physical activity, nutrition, smoking and relaxation	Combination of participative and passive or organizational change strategies, such as policies, educational material, group meetings, challenges and counseling	Participation in general (no participation levels given)	7 focus groups, 4 with white-collar workers and 3 with blue-collar workers (N = 42)	Content analysis	Not mentioned	<i>Enhancers and barriers (general)</i>

reasons for participation (Mayer *et al.*, 2013), or workplace opportunities for participation and implementation strategies to promote participation (Wong *et al.*, 2014).

What methods are used to study these factors?

Data were collected through surveys ($n = 4$), interviews ($n = 3$), focus groups ($n = 4$) or both interviews and focus groups ($n = 4$). In most studies, blue-collar workers were the respondents ($n = 14$). In some studies, workplace managers and/or planners ($n = 5$), or occupational health professionals ($n = 1$) were interviewed about barriers to and facilitators of blue-collar workers' participation. A theoretical model was sometimes used to identify factors: an ecological model ($n = 3$) (e.g. the Angelo framework) or a psychological model ($n = 1$) (i.e. self-determination theory).

Comparisons between participants and non-participants were made in the quantitative studies. This was done by calculating differences in personal characteristics between the two groups, using student's *t*-tests, chi-square tests and Mann-Whitney tests ($n = 2$), or conducting a logistic regression analysis ($n = 2$).

Only one of the studies (McMahon *et al.*, 2002) explicitly compared blue-collar workers to other workers. However, some studies presented conclusions about what characterizes this specific target group, thus implicitly comparing blue-collar workers to other workers.

Which contextual factors and implementation strategies are associated with blue-collar workers' participation in WHPPs?

Table 2 (in the supplementary files) shows an overview of the 77 factors analyzed (quantitative) or reported (qualitative) in the included studies. Highlights are presented in the next sections (see Supplementary Appendix F for a complete overview of the findings).

Organization characteristics associated with participation that were reported in qualitative studies are: work environment support (Sendall *et al.*, 2017, 2018), co-worker support (Mayer *et al.*, 2013; Sendall *et al.*, 2017), organization culture (Lingard and Turner, 2015; Sendall *et al.*, 2017) and colleagues participating in the WHPP (Mayer *et al.*, 2013). Work environment support includes policies and opportunities for healthy lifestyle behavior. Co-worker support includes practical support the employee receives from co-workers. However, it was also reported that WHPP participation could be ridiculed in a blue-collar work environment, which formed a barrier to participation. Sorensen *et al.* (Sorensen *et al.*, 2009) conducted the only quantitative study to investigate organization characteristics, and they found that supervisory and co-worker support had no effect on participation.

With regard to *WHPP characteristics*, group activities were reported to enhance participation (Mayer *et al.*, 2013; Wong *et al.*, 2014). A sense of camaraderie and obligation to the group were reported to enhance continued participation (Podlog and Dionigi, 2009). Other WHPPs that may be attractive for blue-collar workers include WHPPs that require little effort (Mayer *et al.*, 2013; Wong *et al.*, 2014), WHPPs that compensate for the costs of leading a healthy lifestyle, such as free fruit or a free gym membership (Sendall *et al.*, 2017), and WHPPs that provide supervision of exercise (Mayer *et al.*, 2013). In several qualitative studies it was reported that participation is enhanced when WHPPs are affordable and easily accessible in terms of time and place (Podlog and Dionigi, 2009; Boschman *et al.*, 2013; Mayer *et al.*, 2013; Wong *et al.*, 2014; Lingard and Turner, 2015; Sendall *et al.*, 2018). Podlog and Dionigi (Podlog and Dionigi, 2009) reported that for physical activity programs, a comfortable, relaxed environment in which other participants are not overly concerned with their appearance helps to promote exercise adherence. Furthermore, the trainer's proficiency and enthusiasm may help participants continue participation (Podlog and Dionigi, 2009).

With regard to *participant characteristics*, shift work was negatively associated with both initial and continued participation (Sorensen *et al.*, 2009; Mayer *et al.*, 2013; Wong *et al.*, 2014; Cunradi *et al.*, 2015). Sorensen *et al.* (Sorensen *et al.*, 2017) reported that competing work activities also form a barrier to WHPP participation.

In quantitative studies, most demographic factors (e.g. age, gender, marital status and ethnicity) were found to have no significant correlation with participation. Studies that did find effects, did not control for other variables.

In general, the more health issues a worker has, the more likely they are to participate in a WHPP (Jørgensen *et al.*, 2010; Lingard and Turner, 2015; Korshøj *et al.*, 2016). For example, cleaners with musculoskeletal disorders were more likely to participate in an aerobic exercise program (Korshøj *et al.*, 2016). Regaining physical capabilities during the WHPP (e.g. losing weight or being able to lift more weight) was reported as an incentive for continued participation (Podlog and Dionigi, 2009).

Lifestyle behavior does not seem to be strongly associated with participation. No significant correlations with participation were found for physical activity levels, smoking or fruit and vegetable consumption. Not getting adequate sleep was found to enhance participation in WHPPs that are focused on weight management and smoking cessation (Sorensen *et al.*, 2009).

The belief that one is not capable of participation may form a barrier, as was reported in several qualitative studies. For example, older people may lack the

necessary technological skills to use social media interventions (Sendall *et al.*, 2017, 2018). Moreover, mental and physical fatigue at the end of a work day was reported to pose a barrier to participation in WHPPs (Cunradi *et al.*, 2015). In contrast, greater self-efficacy to change lifestyle behavior was positively associated with participation (Hunt *et al.*, 2009).

Family may influence participation in both directions, as was reported in qualitative studies. Feeling obliged to spend time with one's family can hinder participation in a WHPP (Podlog and Dionigi, 2009), but becoming a parent can make a worker feel more responsible for taking care of their own health (Lingard and Turner, 2015). However, Hunt *et al.* (Hunt *et al.*, 2009) found that social support had no effect on participation.

Motivation and positive attitudes may also influence participation. Two qualitative studies reported that motivation enhances both initial and continued participation in a WHPP (Mayer *et al.*, 2013; Sendall *et al.*, 2017). Sorensen *et al.* (Sorensen *et al.*, 2009) found that 'intention to change' affects participation in a smoking cessation program. When workers hold a positive attitude toward WHPPs, they seem more likely to participate (Lingard and Turner, 2015). For example, workers may participate because of expected health benefits or group cohesiveness and competitiveness (Mayer *et al.*, 2013). However, one study found that blue-collar workers, generally, seem to believe that lifestyle is not amenable to change through a WHPP (Varela-Mato *et al.*, 2018).

Attitudes toward the implementer of a WHPP may also affect participation. Barriers to participation might include the attitude that workplaces do not have a role in health and lifestyle (McMahon *et al.*, 2002; Sendall *et al.*, 2017) and concerns about confidentiality (Cunradi *et al.*, 2015). When a union offers the WHPP, identification with the union's problems predicts participation (Hunt *et al.*, 2009).

Several qualitative studies reported on *implementation strategies* that affect participation. Communication about WHPPs may not always reach blue-collar workers (McMahon *et al.*, 2002; Lingard and Turner, 2015). And when it does, they may interpret the programs as meddling, which causes reactance (Varela-Mato *et al.*, 2018). Strategies that may enhance participation are leading by example (Sendall *et al.*, 2017), financial incentives (Mayer *et al.*, 2013) and combining the lifestyle intervention with safety interventions (Sorensen *et al.*, 2017).

DISCUSSION AND CONCLUSION

Discussion

In this scoping review, 19 papers were included that describe quantitative ($n = 4$) and qualitative studies

($n = 11$). In these studies 77 factors are presented of which the association with blue-collar workers' participation in WHPPs was either analyzed quantitatively or reported qualitatively. Of these factors, 72.7% are related to participant characteristics. No information is available on how characteristics of the socio-political context and the implementer influence participation. However, the studies show how several contextual factors and implementation strategies may affect participation.

Few demographic factors found in this review were associated with participation. This is in contrast with earlier reviews on participation (Robroek *et al.*, 2009; Edwards, 2012; Hassard *et al.*, 2012) that often found such factors (e.g. gender, marital status, educational level and age) were determinants of participation. This raises the question of whether being a blue-collar worker could be a confounding factor in explaining participation. For example, many blue-collar workers work in male-dominated industries where participation in WHPPs or a healthy lifestyle could be ridiculed (Caddick *et al.*, 2016; Staats *et al.*, 2017; Mäkinen and Heikkilä-Tammi, 2018). This may make it less likely for both women and men in these industries to participate in WHPPs. Future research may give insight into how demographic characteristics and occupation interact and influence participation.

Other findings in this review are mostly in line with earlier research. For example, shift work has consistently been found to be a barrier to participation (Robroek *et al.*, 2009; Nabe-Nielsen *et al.*, 2015). Other barriers to WHPP participation that are in line with barriers found in previous studies include inconvenient scheduling, lack of peer support and the attitude that the workplace should not interfere with one's lifestyle (Edwards, 2012; Hassard *et al.*, 2012; Smit *et al.*, 2022). While factors related to blue-collar workers' participation may be comparable to those related to other workers' participation, factors that have a negative effect may be more prevalent among blue-collar workers. For example, some studies suggest that blue-collar workers have less job flexibility, making it harder to participate in WHPPs (Edwards, 2012; Mattke *et al.*, 2013; Roy *et al.*, 2019). Moreover, McMahon *et al.* (McMahon *et al.*, 2002) found that, compared to white-collar workers, blue-collar workers less often perceived a role for employers in their lifestyle.

Earlier research found contradicting results for the influence of health complaints on participation. According to Edwards (Edwards, 2012), health complaints could either cause an employee to act or cause them to be reluctant to participate in WHPPs out of fear of exposing their health issues to managers. Moreover, employees with health complaints may be more likely to already be participating in health

promotion activities outside the workplace. In the current review, it was found that having more health complaints is positively associated with participation. An explanation for this finding could be that in the included studies, WHPPs were either designed and implemented with the target group [e.g. (Lingard and Turner, 2015)] or addressed the most relevant occupational health risks the target group faced [e.g. (Jørgensen *et al.*, 2010; Korshøj *et al.*, 2016)]. When a WHPP specifically focuses on the workers' actual health risks, workers may feel more inclined to participate. It may also be true that blue-collar workers are less likely than white-collar workers to participate in a WHPP when they feel healthy. Wardle and Steptoe (Wardle and Steptoe, 2003) found that blue-collar workers are less concerned about their future health than other workers. An important question for future research is how to reach employees who feel no urgency to change their lifestyle.

As for content, in this review, it was found that blue-collar workers may prefer WHPPs that require little effort or commitment (e.g. low-impact physical exercises, cost compensation for healthy living). However, as some authors have stressed before, more passive WHPPs that lower thresholds for participation should be combined with more active interventions to effectively change behavior [e.g. see (Gorczyński *et al.*, 2020)]. This can be achieved by increasing the impact during the WHPP: low-impact activities at the start to attract workers, and high-impact activities toward the end to accomplish lifestyle change. Furthermore, the current review shows that, in general, blue-collar workers may prefer group activities over individual activities. Group activities may generate peer support and feelings of obligation and camaraderie to the group, which could enhance continued participation. However, some workers may not prefer group activities and a mismatch between preferences and WHPPs may lower participation levels (Rongen *et al.*, 2014). A needs assessment and a participatory approach can help tailor WHPPs to specific needs, and in result may help enhance participation [e.g. see (Schaap *et al.*, 2020; Wronska *et al.*, 2022)]. Another solution is to offer a broad range of interventions the employee can choose from (Serxner *et al.*, 2004).

Possible effective implementation strategies found in this review are: financial incentives, leading by example and combining lifestyle interventions with occupational safety programs. Furthermore, a number of factors were found that can be used in designing implementation strategies. For example, employees may be more likely to participate when they feel a sense of duty toward family that compels them to take care of their health (Lingard and Turner, 2015). Communication strategies that focus on family responsibility may appeal to blue-collar workers (Strickland *et al.*, 2015).

However, the finding that blue-collar workers may perceive communication as meddling aligns with the recommendation from several authors that companies should not pressure blue-collar workers to participate in WHPPs (Kaufman *et al.*, 2015; Coupe *et al.*, 2018). Furthermore, since shift work seems to be a major barrier to participation, companies should pay more attention to making WHPPs accessible and attractive for shift workers. Based on their review of WHPPs for this target group, Demou *et al.* (Demou *et al.*, 2018) suggest employers offer flexibility, allow time off and pay employees for participation. Future research can investigate which WHPPs and implementation strategies effectively enhance participation. This can be done by using a semi-experimental design or by conducting thorough qualitative process evaluations.

The studies in this review show a wide variety in initial participation levels, ranging from 9 to 61%. The median in this review is 46%, which is higher than the median of 34% found in a review by Robroek *et al.* (Robroek *et al.*, 2009). This is striking since most studies report lower participation levels among blue-collar workers than among other workers (Toker *et al.*, 2015; Tsai *et al.*, 2019). A possible explanation may be that all the WHPPs in the current review were specifically aimed at blue-collar workers, either by design or in implementation strategy. This may have contributed to higher participation levels.

However, different measures for participation and differences in comparison groups limit the external validity of these results. For example, initial participation measures varied from consenting to participate to attending the first session, and comparison groups varied from all employees in the organization to subgroups (e.g. union members who smoke or employees with a health risk).

It is also striking that the only HRA in this review showed the lowest participation levels (9%) (Boschman *et al.*, 2013). One might expect that HRAs would yield higher participation levels because of the low effort they require (Glasgow *et al.*, 1993). However, according to Rutter *et al.* (Rutter *et al.*, 2017), simple individual-level interventions require high levels of individual agency and therefore attract low levels of participation. Another explanation could be that in the study by Boschman *et al.* (Boschman *et al.*, 2013), the WHPP was provided by an external occupational health service, which may have created an extra barrier to participation.

Gaps in research and implications for future research

In this review, no studies were found in which the characteristics of the socio-political context were studied or found to be associated with participation.

However, such factors may influence blue-collar workers' participation in WHPPs. Insights into the influence of factors at this level may be relevant for policymakers. For example, health insurance systems (Edwards, 2012), the way unions are organized and play a role in occupational health (Barbeau *et al.*, 2005) or laws on injury liability (Fletcher *et al.*, 2008) may affect participation levels. Another group of factors that were not studied or reported is 'characteristics of the implementer'. Although different implementers (employer, union and occupational health service) were involved across studies, none focused on the association between the type of implementer and participation. Future research may investigate the influence of socio-political factors and implementer characteristics on participation by comparing participation levels between countries and companies that use different types of implementers.

Furthermore, most of the included studies did not use theory in the design. In most of the qualitative studies, respondents were merely asked for barriers to and facilitators for participation. A theoretical framework could help to identify possible factors on different levels. This is in line with the call from several authors to use more theory in studying factors that influence behavior in implementation science [e.g. see (Linnan and Steckler, 2002; Atkins *et al.*, 2017)].

A final remark concerns the complexity of WHPP implementation. Causal linear models are used in most WHPP implementation studies. However, factors that influence behavior also can directly or indirectly influence other factors (Rutter *et al.*, 2017; Mohameddi, 2019). This complexity makes it difficult to detect pathways to successful implementation (Grøningsæter and Kiland, 2022). For example, investment in healthy work conditions may lead some employees to be more willing to participate in WHPPs. Their participation, in turn, may stimulate co-workers to participate [e.g. see (Mayer *et al.*, 2013)] but may also create a social norm which causes reactance to participate [e.g. see (Röttger *et al.*, 2017)]. A complex systems approach may be better able to show possible pathways to success that are adaptable to specific contexts (Rutter *et al.*, 2017; Mohameddi, 2019).

Limitations of the study

Only 15 studies were included in this review. Many process evaluations did not meet the inclusion criterion regarding a description of how factors were assessed or analyzed. Often, articles only present percentages of drop-out reasons, or only the significant factors. Such studies were excluded because of reporting bias. In addition, design studies and needs assessments were not included, most often because they used no outcome variable beyond intention to participate.

However, such studies could increase understanding of the needs, attitudes and motivation of this target group.

No inclusion criteria were formulated for the quality of studies, except for a description of the data collection, method of analysis and results. Thus, for quantitative studies, both comparisons and multivariate analyses were included, and for qualitative studies, articles were included with no detailed description of how themes were derived from the data. Criteria for quality were not formulated because of the narrow focus of the review. Therefore, it is good to be cautious when interpreting the results. These results may stimulate researchers to collect more evidence on what works when explaining or encouraging blue-collar workers' participation in WHPPs.

The framework developed by Wierenga *et al.* (Wierenga *et al.*, 2013) made it possible to categorize all factors associated with participation. However, the analyzed and reported factors were not evenly distributed. Because our implementation outcome concerned an individual's behavior, it seems only logical that participant characteristics and in particular psychological determinants, were the most analyzed and reported group of factors. A psychological model or framework specifically designed for studying implementation behavior, such as the Theoretical Domains Framework (Michie *et al.*, 2014), could be a useful addition to the implementation model to differentiate between psychological factors and thus provide insight into which domains of psychological determinants should be addressed to enhance participation.

A result of limiting the target group to blue-collar workers was that most included studies focused on male employees. This may be an important limitation to consider with regard to implementing WHPPs, since male and female blue-collar workers may be attracted to different programs and messages.

Although this review presents an overview of factors associated with blue-collar workers' participation, it is important to note that participation is not a goal in itself. As Serxner *et al.* (Serxner *et al.*, 2004) pointed out, a person who participates in a WHPP before they are ready may have a negative experience, lowering their self-efficacy. Therefore, it is important to deduce which groups may benefit from WHPPs but are not yet being reached.

Conclusion

This scoping review presents an overview of studies that investigated factors associated with blue-collar workers' participation in WHPPs. Based on the 15 included studies, the following conclusions can be drawn:

1. Only participant characteristics were analyzed or reported in most studies. There is a lack of knowledge about the association between socio-political or implementer characteristics and blue-collar workers' participation;
2. WHPPs that may attract blue-collar workers address their needs, are tailored from a broad range of activities, contain group activities and require little effort and commitment at the start;
3. Implementation strategies that seem to effectively enhance participation are using incentives, leading by example and combining WHPPs with occupational safety interventions;
4. WHPPs seem to be able to reach blue-collar workers, but it is challenging to reach shift workers and those who do not yet experience health complaints.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *Health Promotion International* online.

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ETHICAL APPROVAL

Since this paper describes a scoping review of the literature, ethical approval was not necessary.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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