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Can a participatory organizational intervention improve social capital and organizational readiness to change? Cluster randomized controlled trial at five Danish hospitals

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Running head: Participatory intervention and social capital

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Conflict of interest

No conflict of interest has been declared by the authors.

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Author contributions

Author MDJ and LLA designed and conducted the study. All authors have contributed to the analysis and interpretation of the results and drafting of the manuscript All authors have agreed on the final version of this manuscript.

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Running head: Participatory intervention and social capital

Abstract

AIM: This study investigates the effect of a participatory organizational intervention on social capital and organizational readiness for change.

DESIGN: Cluster randomized controlled trial

METHODS: In 2016, twenty-seven departments from five hospitals in Denmark were randomly allocated at the department level to one year of participatory intervention (14 clusters, 316 healthcare workers) or a control group (13 clusters, 309 healthcare workers). The participatory intervention consisted of 2x2 hour workshops where managers, 2-5 healthcare workers from each department and the hospital's health and safety staff, developed action plans for implementing solutions for improving the use of assistive devices at the department throughout the one-year intervention period. Workplace social capital: (1) within teams (bonding); (2) between teams and nearest leaders (linking A); and (3) between teams and distant leaders (linking B) and organizational readiness for change were measured using questionnaires at baseline, 6 and 12 months.

RESULTS: No *group by time* interaction occurred for any of the outcome measures. However, explorative post hoc analysis showed within-group improvements in bonding and linking B social capital and Organizational readiness for change following the participatory intervention.

CONCLUSION: Participatory organizational interventions may improve social capital within teams and between teams and distant leaderes and Organizational readiness for change.

IMPACT: Implementing participatory interventions at the workplace may be a cost-effective strategy as they provide additional benefits, e.g. increased social capital and improved organizational readiness for change, that exceed the primary outcome of the intervention.

Trial registration: ClinicalTrials.gov (NCT02708550) March 2016

Key words: human capital, ergonomics, occupational, work-related, randomized trial, nursing

Introduction

The concept of social capital has been broadly defined as the resources that individuals access through their social networks (Kawachi and Berkman 2001). These social networks are

characterized by shared norms, knowledge, values and understandings among e.g. family, friends and colleagues and the foundation of these norms may have widespread consequences. Public health research has in recent years provided evidence of a relationship between workplace social capital and individual worker health. Low social capital has been associated with several health and work-related factors i.e. poor self-rated health (Oksanen et al. 2008), a higher risk of mental-health problems (Oksanen et al. 2010; Tsuboya et al. 2015), sickness absence (De Clercq et al. 2015; Rugulies et al. 2016; Török et al. 2018), burnout (Kowalski et al. 2010), preseentism, high exit rates (Jensen et al. 2018), early retirement (Breinegaard et al. 2017), individual wellbeing, trust and coorporation among colleagues and efficiency in production processes (Hasle and Møller 2007). On the other hand, having both moderate and high social capital may buffer against perceived stress (Jay and Andersen 2018).

Background

Social capital at work is multidimensional as it consists of several aspects such as the social networks within or between teams and their leaders (Borg et al. 2014; Meng et al. 2018). To investigate these aspects, Borg and Co-workers developed and validated a four-dimensional questionnaire to measure social relations within working teams (bonding), between working teams (bridging), between teams and nearest leaders (linking A) and between teams and distant leaders (linking B) (Borg et al. 2014; Meng et al. 2018).

Because low social capital not only affects the individual worker, but the entire workplace, improving social capital seems to be an important strategy for promoting job-satisfaction, engagement and wellbeing at work (Strömgren et al. 2016; Meng et al. 2018). Thus, building social capital may benefit most workplaces. Because healthcare work is challenging and highly dynamic, as it consists of a variety of job tasks such as patient handling and care, medicine provision and journaling which are job tasks that often rely on collaboration and shared norms, a strategy aiming at improving social capital among healthcare workers and their management may contribute towards creating a well-functioning healthcare system.

One apparent method for building social capital at work is to intervene directly and broadly on work-related social relationships between workers in teams and between workers and their leaders (Salas et al. 2008; Stajkovic et al. 2009; Buljac-Samardzic et al.

2010; Kukkurainen et al. 2012; Long et al. 2013; Gittell et al. 2013). Yet, using a more indirect method, our research group has previously shown that performing workplace based physical exercise during working hours together with colleagues improved bonding social capital among healthcare workers (Andersen et al. 2015). Using a similar indirect approach that doesn't specifically aim at improving social relationships, the present study will investigate whether social capital is strengthened by implementing participatory workshops at the department-level that aim improved the healthcare workers' use of assistive devices for patient handling.

Most behavioral workplace research has focused on the individual worker, e.g. the readiness to change in relation to health promotion strategies e.g. exercise, smoking cessation regiments and diet (Kilpatrick et al. 2014; Mache et al. 2015; Bulotaitė et al. 2017; Helfrich et al. 2018; Street and Lacey 2018). However, when considering a complex phenomenon like a workplace, the workplace as a whole has to be ready for engaging in such organizational changes to achieve success. Organizational readiness for change refers to the psychological and behavioral preparedness of organizational members when subject to implementation of a new practice, policy, or technology (Weiner 2009). As a result, organizational readiness may be seen as a key determinant of implementation success and a mediator of the effectiveness of the implementation process (Armenakis et al. 1993; Weiner 2009; Holt et al. 2010) e.g. through a participatory process as in the present study. Nevertheless, sustaining a high level of organizational readiness for change throughout the implementation process may be equally important when introducing changes over a long period of time.

The Study

Aim

The aim of this study was to investigate the effect of a participatory organizational intervention on social capital and organizational readiness for change. We hypothesized that a participatory organizational intervention where workers and management collaborate together to find solutions for increasing the healthcare workers use of assistive devices for patient handling will improve social capital within teams and between workers and their department leaders, as well as organizational readiness to change.

Methodology

Design

This article presents secondary outcomes of a two-armed parallel-group, single-blind, cluster randomized controlled trial with the primary aim of investigating the effect of participatory intervention on the use of assistive devices for patient handling at Danish hospitals (Jakobsen et al. 2019). The study protocol (Jakobsen et al. 2016) and primary outcome (Jakobsen et al. 2019) has been published elsewhere. In brief, healthcare workers from five hospitals in Denmark situated in the areas of Zealand (N=4) and Jutland (N=1) participated in the study from April 2016 - April 2017. Allocation was concealed and clusters were hospital departments and hospital units. Cluster randomization was used to avoid contamination between individuals of each group. A person blinded to the status of each department performed the randomization, after the collection of the baseline data using a random numbers table. The departments were parallel assigned to either a 12-month participatory intervention group or to a control group for a period of 12 months. The participants and their department managers were informed by e-mail about their group allocation.

Participants - recruitment and randomization

Figure 1 shows the flow of the participants through the study. Recruitment of Danish comminity hospital departments started in 2014 and continued throughout 2015 by initially contacting the occupational safety and health (OSH) staff from eleven hospitals. Five hospitals were interested in participating. The hospitals' OSH staff pointed out a total of 35 departments that met the inclusion criteria (performing patient transfers daily using assistive devices) of which 29 departments were interested in participating. The final recruitment was administered in February 2016 by e-mailing a baseline questionnaire to 1052 healthcare workers (nurses and nursing aids) employed at the 29 departments. Prior to randomization, two departments withdrew from the study due to limited time resources for participation in the study. Finally, a total of 27 departments with 625 healthcare workers were willing to participate. Descriptive baseline characteristics of the 13 departments in the control group and 14 departments in the intervention group are shown in Table 1.

Intervention

Phase 1: Assessment of barriers and potential solutions

Information about barriers and potential solutions for using assistive devices that could be used for guiding the subsequent participatory intervention were collected using a questionnaire, interviews, observations as well as an analysis of a 'best practice' hospital prior to randomization (see (Jakobsen et al. 2016) for details). In brief, Phase 1 revealed that the most important barriers for using assistive devices were: insufficient time to use the assistive devices, outdated assistive devices, misclassification of the patients' functional capabilities, availability of assistive devices and lack of space. Moreover, potential solutions for improving the use of assistive devices were having a present and active management that encourages guidance, communication and collaboration in the use of assistive devices and provides sufficient time for patient transfer as well as ensuring proper space and availability of assistive devices.

Phase 2: Participatory intervention

The participatory intervention has been described in details in the protocol (Jakobsen et al. 2016). In short, the intervention consisted of two two-hour workshops. We aimed at recruiting the department manager, 2-5 healthcare workers, who were appointed by their managers and the hospital's OSH consultants for every workshop. During the two workshops, the workshop participants were asked to develop and implement an action plan with possible solutions on how to improve the use of assistive devices in their department.

Workshop I consisted of two main parts: Part 1 - The participants were initially asked to engage in a brainstorm session to identify potential solutions for improving the use of assistive devices in their department. The brainstorm session was based on discussions of the main results of the department's baseline questionnaire results and the results from the general assessment of barriers and potential solutions for the use of assistive devices (Phase 1). Part 2 - Development of a simple action plan for the single most achievable solution. The participants were asked to implement this solution over the course of the following approximately ten weeks prior to workshop II.

The participants were invited for Workshop II approximately three to four months after workshop I. Workshop II consisted of two parts. Part 1: Discussion of the department's experiences with implementing the action plan developed in workshop I. Part 2: Development of an action plan for implementing up to five solutions that the participants

were motivated for and thought would potentially improve the department's use of assistive devices over the subsequent six to nine months.

While creating the action plans, the participants were asked to specify the following points: a) why the solutions were important for their department, b) who were responsible for the implementation of the solutions and c) to set deadlines for the implementation. The implementation process was evaluated using small electronic surveys, e-mail or telephone calls addressed to the department's workshop participants. After workshop II no additional counseling on how to succeed in implementing the department's action plan was provided from the researchers.

Control group

The participants of the control group (N=13 departments) were encouraged to continue with their normal working procedures including living up to standard organizational health and safety guidelines during the 12-month study period.

Data collection

Outcome variables

Social capital in the department (bonding), between the department and the nearest manager (linking A) and between the department and distant leader (linking B) was measured at baseline, 6-months and 12-months follow-up using an online questionnaire distributed to the participants by E-mail (Borg et al. 2014). Two sample questions out of 9 questions for bonding social capital (Cronbach's α: 0.69) are: 'There is a feeling of unity and cohesion in my team.' and 'In my team, we help colleagues who have too much to do'. Two sample questions out of six questions for linking A social capital (Cronbach's α: 0.63) are: 'Our nearest leader has great knowledge and understanding of the work we do' and 'Our immediate manager takes our needs and views into consideration when he/she makes decisions'. Two sample questions out of four questions for linking B social capital (Cronbach's α: 0.65) are: 'There is a common understanding between the management and employees on how we should perform our work tasks' and 'Are the employees involved in decisions about changes at the workplace?'. The Participants replied on a horizontally oriented scale of 0–10, where 0 is 'no, not at all' and 10 is 'Yes, completely'. The average

value of all questions was calculated for each of the three social capital dimensions and multiplied by 10 (i.e. 0–100) (Andersen et al. 2015).

To measure how well the departments and the hospital as a whole were ready for implementing new changes in the department, we measured Organizational readiness for change readiness using 12 questions (Cronbach's α: 0.88) developed by Shea et al. (Shea et al. 2014). Two sample questions are 'Persons who work here are determined to implement this change' and 'Persons who work here feel confident that they can keep the momentum going in implementing this change 'The participants reported their Organizational readiness for change, in a similar fashion as for the questions on social capital, by replying on a horizontally oriented scale of 0–10, where 0 is 'no, not at all' and 10 is 'Yes, completely'. The average value of all questions was calculated and multiplied by 10 (i.e. 0–100).

Reliability and validity

The social capital questionnaire was developed and validated at the National Research Centre for the Working Environment in Copenhagen, Denmark (Borg et al. 2014). The validity of the social capital questionnaire was tested in confirmatory factor analyses in two different samples and in both analyses satisfactory model fits were reported for the four-factor solution that was also used in this study (Borg et al. 2014; Meng et al. 2018).The questionnaire on organizational readiness for change readiness was developed and validated by Shea et al. (Shea et al. 2014). The reporting and design of the present study followed the SPIRIT (Chan et al. 2013b, a) statements and CONSORT statement for cluster randomized controlled trials (Campbell et al. 2012).

Ethical considerations

The Danish National Committee on Biomedical Research Ethics (The local ethical committee of Frederiksberg and Copenhagen; H-3-2010-062) approved this study as part of the research program "*Implementation of physical exercise at the workplace (IRMA)*". Danish law states that neither questionnaire nor register-based studies require approval by ethical and scientific committees or informed consent. However, all participants receiving the questionnaires were informed about the purpose of the study. Only the workshop participants were asked to give their written informed consent to participate in the study. According to an institutional agreement with the Danish Data Protection Agency, The National Research Centre for the

Working Environment is required to treat all research data confidential (journal number 2015-41-4232), e.g. by anonymizing all individual data and saving data at a protected drive with limited access. The trial *"Participatory Organizational Intervention for Improved Use of Assistive Devices for Patient Handling*" was registered in ClinicalTrials.gov (NCT02708550) prior to randomization of participants.

Data analysis

The change in social capital and Organizational readiness for change was evaluated using a linear mixed model (PROC Mixed, SAS Institute, Cary, NC). Cluster (department) was entered in the model as a random factor. All statistical analyses were performed in accordance with the intention-to-treat principle using a linear mixed model, which accounts for missing values. An α-level of 0.05 was accepted as statistically significant. Outcomes are reported as between-group least mean square differences and 95% confidence intervals from baseline to 6-month follow-up and from 6-month follow-up to 12-month follow-up.

The sample size calculation was based on the primary outcome reported elsewhere and showed that 13 clusters in each group (26 departments in total) were needed for testing the null-hypothesis of equality (α=0.05) with a power of 95%, SD of 10% and a minimal relevant group-difference in the use of assistive devices of 15%. We did not perform an a priori sample size calculation for the outcomes in this article.

Results

Adherence and adverse events

All departments, except one, participated in the two scheduled workshops. Thus, we conducted 26 workshops in total with 13 departments. As one department underwent a change in management during the study they could not prioritize participation in the workshops. Another department from the intervention group withdrew from the study a few weeks after the second workshop due to changes in the priority of work environmental challenges. Forty-nine percent of the ones, who answered to the baseline questionnaire, replied to the questionnaire at 12-month follow-up (Figure 1). One participant, from the control group, reported having experienced an adverse event (increased pain) as a result of

participating in the project. However, the subject did not specify what led to the increased pain.

Social capital and organizational readiness for change

Baseline values for bonding, linking A and linking B social capital were 74, 67 and 66 in the control group, respectively and 74, 70 and 69 in the intervention group, respectively (Table 2). From baseline to follow-up, no group-by-time interaction was seen for the investigated three dimensions of social capital, i.e. the changes in the intervention group were not large enough to differ significantly from the changes in the control group (Table 2). Yet, explorative post hoc analysis revealed that social capital in the department was increased in the intervention group, ie. bonding social capital was significantly higher after 6 (2.83 95% CI 0.70-4.97, p=0.009) and 12 (3.15 95% 0.87-5.43, p=0.007) months compared with the baseline values following the participatory intervention. Linking A social capital did not change within the intervention or control group from 6 to 12 months. However, explorative post hoc analysis also showed significantly improved (2.70 95% CI 0.15-5.25) linking B social capital from 6-months to 12-months follow-up in the intervention group. Hence, resulting in a significant difference (5.43 95% CI 1.67-9.19) between the groups at 12-months follow-up.

At baseline, Organizational readiness for change was 71 and 67 in the control and intervention group, respectively. As with social capital, there were no differences between the groups over time in the organization's readiness for change. However, like bonding social capital, analyses performed within the groups (post-hoc) showed that Organizational readiness for change was improved by 4.41 (95% CI 0.63 to 8.19, p=0.022) points from baseline to 12-month follow-up as a result of the participatory intervention (Table 3).

Discussion

Although no group by time interaction was observed, the present study showed indications of within-group improvements in bonding and linking B social capital and organizational readiness for change in response to a 12-month participatory intervention for improved use of assistive devices at Danish hospitals.

Partly supporting our hypothesis, indications of increased bonding social capital – ie. in the department - were found in the intervention group following 6 and 12 months of the participatory intervention. This is an interesting finding since social capital bonding can be improved through an indirect approach such as worker involvement where the workers develop solutions for increasing the use without directly focusing on building social capital. In the present study, bonding social capital increased 3.2 points on a scale of 0–100 in the intervention group. Our research group has previously shown that performing 12 weeks of exercise at the workplace improved bonding social capital by 5 points compared with exercising alone at home – i.e. a significant group by time interaction - among healthcare workers, thus supporting the efficacy of indirect, yet worker engaging, interventions on social capital (Andersen et al. 2015). It must be considered that in the present study the workers only met – as a direct part of the intervention – twice. In the previous exercise study, workers from the entire department met three times a week for twelve weeks. The difference in volume of direct engagement with each other may explain that the exercise intervention showed more convincing results in terms of improving bonding social capital. In comparison, using a more direct approach Sun and co-workers observed that implementing a 6-month comprehensive workplace social capital intervention, without particular participatory involvement, did not have an effect at center level and only slightly improved horizontal (i.e. bonding) social capital at facility-level in community health centers of urban China (Sun et al. 2014). Taken the aforementioned scarce number of conducted randomized controlled trials into account, the use of more indirect, yet worker engaging, interventions, may potentially be an even more cost-effective alternative as they seem to provide benefits, e.g. increased social capital etc., that exceed the primary outcome of the intervention.

Achieving high social capital has been linked to several positive factors in healthcare work i.e. strengthened job satisfaction, organizational commitment (Hsu et al. 2011), quality and safety of patient care and risk management (Gloede et al. 2013; Strömgren et al. 2016; Shin and Lee 2016) . Thus, improving social capital may not only have a positive impact on the worker's health but also the patients. As social capital has been shown to facilitate improved coordination among workers and exchange of explicit and tacit knowledge (Chang et al. 2012) these factors may be some of the potential underlying mechanisms for improved patient care quality and safety. Although we did not measure patient quality and safety, we have previously reported that the present participatory intervention not only increased objectively measured use of assistive devices, but also

improved self-reported discussion and guidance on how to use assistive as well as perceived attention on how the workers use their body at work (Jakobsen et al. 2019). Thus, exchange of explicit and tacit knowledge may have improved patient handling technique and use of assistive devices as well as quality of care, hence, leading to reduced physical loading and discomfort on the healthcare worker as well as the patient. Altogether, the potential underlying factors of the present changes in bonding social capital may be a combination of several contributors e.g.: improved collaboration, coordination and intercommunication about work tasks; enhanced quality of relations (trust, respect, recognition); increased shared tacit knowledge and mental models; improved solidarity and collective self-efficacy

It should be noted that only fraction of the department (i.e. 2-5 workers of a department with approximately 20 workers) was selected for participation in the participatory workshops. Accordingly, participation in the workshops may presumably have led to improved bonding among the participants whereas potential changes in social capital for the remaining department was more dependent on the subsequent implementation process of the solutions for improved use of assistive devices developed in the the workshops.

Although the present intervention was coined as a participatory organizational intervention, the distant leaders and toplevel organization was not particularly involved in the intervention. Yet, post hoc analysis showed that social capital between the department and the distant leaders (linking B) increased from 6 to 12 months following the intervention and resulted difference between the groups at 12-months follow-up. While such explorative analyses should be interpreted with caution, this change seems realistic because some of the questions regarding linking B actually addressed issues that the intervention aimed at promoting e.g. creating a 'common understanding between the management and employees' on how they should perform the work tasks as well as the workers involvement in 'decisions about changes at the workplace'. Conversely, because the department leaders were invited for the workshops, we hypothesized that the participatory intervention would improve linking A social capital between the department and nearest leader. However, this hypothesis could not be confirmed. A plausible explanation for this is that not all department leaders took part in the offered workshops (15 out of 26 workshops) and therefore did not contribute to building social capital between the leader and the participants during the workshops. On the other hand, an encouraging and supporting department leader during the implementation of the solutions for improved use of assistive devices would probably strengthen linking A social capital among the workshop participants as well the remaining department.

Andersen and co-workers found that linking A social capital decreased following 12 weeks of exercise at work, but not in the group exercising at home among healthcare workers, although this was not significantly different between the groups. The authors suggested that an imbalance between expectations and realities may lead to a decrease in social capital between the department and nearest leader. A similar imbalance between expectations, realities and implementation level represents a plausible predicament for improving linking A social capital in thisstudy. Indeed, management support seems vital for implementation success in the present study as most developed solutions for improved use of assistive devices i.e.: 1) provision of more specific and systematic competence training; 2) improving availability and visibility of existing assistive devices; 3) improving knowledge about the patient's needs for assistive devices; and 4) improving teamwork and mutual support in the proper use of assistive devices, relied on the managers to support the workers in prioritizing time for implementing these. In fact, the nurse manager role has been identified as a key role to organizational success and can have profound impact on influencing productivity and financial stability, quality of patient care, job satisfaction and organizational commitment (Wendler et al. 2009; Chase 2012; Cathcart and Greenspan 2012; Gilbert et al. 2017). Moreover, Helfrich and co-workers argued that management and their impact on organizational climate and contextual variables influences the adoption of change initiatives (Helfrich et al. 2018). It is, therefore, of high importance to involve the department management in the development of solutions and implementation of action plans during such participatory processes. Not only to motivate the department managers to implement changes, but also to show the workers that the management supports these changes and by doing so, build social capital between the workers and department manager.

As observed for social capital, organizational readiness for change did not change between groups over time in the present study. However, post hoc analysis revealed that within-group changes in Organizational readiness for change occurred following the 12-month participatory intervention. Organizational readiness for change increased 4.4 points from 66.8 to 70.2 on a 0-100 scale in the present study. The healthcare workers in the intervention group were, therefore, moderately ready for implementing organizational changes i.e. implementing solutions for increasing the use of assistive devices at baseline. As noted by Helfried and co-workers, Organizational readiness for change can be used as a prognostic tool to predict the likelihood of organizational change success and to identify specific weaknesses or deficits in readiness before initiating interventions. Although we

assessed Organizational readiness for change prior to the intervention, we did not specifically identify the department's weaknesses in readiness to target and support these during the implementation of the intervention. Nonetheless, the workers enrolled in the participatory intervention not only maintained-, but actually seemed to increase their level of readiness despite the rather long 12-month intervention period. This implies that the intervention was meaningful for the workers of the participatory group throughout the study period. Which may in part explain the many positive results observed following the present participatory intervention i.e. increased use of objectively measured use of assistive devices, increased communication and guidance in use of assistive devices compared with the control group (Jakobsen et al. 2019) and the current within-group changes in bonding and linking B social capital.

Limitations

The use of a cluster randomized controlled trial design was a strength as it protects against contamination between departments allocated to the intervention and the control group. However, participants from different departments may have met and talked about the project, e.g. during lunch breaks. Nonetheless, the risk of between-department or between-group contamination is far less in cluster randomized trials than individually randomized trials. The explorative post-hoc analysis performed on data, in spite of no statistically significant group by time interaction, should be interpreted with caution. Nonetheless, these explorative analyses provide indications of the interventional effect for future studies that e.g. aim to investigate the effect of participatory workshops offered at a higher rate or duration than in the present study. The loss of participants to follow-up (49 % of baseline respondents replied to 12-month follow-up) is a limitation of the study. However, all randomized participants were included in the intention-to-treat analyses, which strengthen the validity of the estimated effects. Another limitation is that blinding of participants was not possible due to the behavioral intervention design. Finally, the generalizability of the present results is limited to healthcare workers working at hospitals.

Conclusion

Although no differences occurred between the groups over time, post hoc analysis indicated improvements in bonding and linking B social capital within teams and between teams and

distant leaders and organizational readiness for change following 12 months of participatory organizational intervention.

References

Andersen LL, Poulsen OM, Sundstrup E, et al (2015) Effect of physical exercise on workplace social capital: Cluster randomized controlled trial. Scand J Public Health 43:810–8. https://doi.org/10.1177/1403494815598404

Armenakis AA, Harris SG, Mossholder KW (1993) Creating Readiness for Organizational Change. Human Relations 46:681–703. https://doi.org/10.1177/001872679304600601

Borg V, Mateu N, Clausen T (2014) Udvikling af en ny metode til undersøgelse af social kapital på arbejdspladsen

Breinegaard N, Jensen JH, Bonde JP (2017) Organizational change, psychosocial work environment, and non-disability early retirement: a prospective study among senior public employees. Scand J Work Environ Health 43:234–240. https://doi.org/10.5271/sjweh.3624

Buljac-Samardzic M, Dekker-van Doorn CM, van Wijngaarden JDH, van Wijk KP (2010) Interventions to improve team effectiveness: a systematic review. Health Policy 94:183–195. https://doi.org/10.1016/j.healthpol.2009.09.015

Bulotaitė L, Šorytė D, Vičaitė S, et al (2017) Workplace health promotion in health care settings in Finland, Latvia, and Lithuania. Medicina (Kaunas) 53:348–356. https://doi.org/10.1016/j.medici.2017.10.002

Campbell MK, Piaggio G, Elbourne DR, et al (2012) Consort 2010 statement: extension to cluster randomised trials. BMJ 345:e5661

Cathcart EB, Greenspan M (2012) A New Window Into Nurse Manager Development: Teaching for the Practice. JONA: The Journal of Nursing Administration 42:557–561. https://doi.org/10.1097/NNA.0b013e318274b52d

Chan A-W, Tetzlaff JM, Altman DG, et al (2013a) SPIRIT 2013 statement: defining standard protocol items for clinical trials. Ann Intern Med 158:200–207. https://doi.org/10.7326/0003-4819-158-3-201302050-00583

Chan A-W, Tetzlaff JM, Gøtzsche PC, et al (2013b) SPIRIT 2013 explanation and elaboration: guidance for protocols of clinical trials. BMJ 346:e7586

Chang C-W, Huang H-C, Chiang C-Y, et al (2012) Social capital and knowledge sharing: effects on patient safety. J Adv Nurs 68:1793–1803. https://doi.org/10.1111/j.1365-2648.2011.05871.x

Chase LK (2012) Are you confidently competent? Nurs Manage 43:50–53. https://doi.org/10.1097/01.NUMA.0000413646.50095.e4

De Clercq B, Clays E, Janssens H, et al (2015) Health Behaviours As a Mechanism in the Prospective Relation between Workplace Reciprocity and Absenteeism: A Bridge too Far ? PLoS ONE 10:e0141608. https://doi.org/10.1371/journal.pone.0141608

Gilbert JH, Von Ah D, Broome ME (2017) Organizational intellectual capital and the role of the nurse manager: A proposed conceptual model. Nurs Outlook 65:697–710. https://doi.org/10.1016/j.outlook.2017.04.005

Gittell JH, Godfrey M, Thistlethwaite J (2013) Interprofessional collaborative practice and relational coordination: improving healthcare through relationships. J Interprof Care 27:210–213. https://doi.org/10.3109/13561820.2012.730564

Gloede TD, Hammer A, Ommen O, et al (2013) Is social capital as perceived by the medical director associated with coordination among hospital staff? A nationwide survey in German hospitals. J Interprof Care 27:171–176. https://doi.org/10.3109/13561820.2012.724125

Hasle P, Møller N (2007) From Conflict to Shared Development: Social Capital in a Tayloristic Environment. Economic and Industrial Democracy 28:401–429. https://doi.org/10.1177/0143831X07079355

Helfrich CD, Kohn MJ, Stapleton A, et al (2018) Readiness to Change Over Time: Change Commitment and Change Efficacy in a Workplace Health-Promotion Trial. Front Public Health 6:110. https://doi.org/10.3389/fpubh.2018.00110

Holt DT, Helfrich CD, Hall CG, Weiner BJ (2010) Are you ready? How health professionals can comprehensively conceptualize readiness for change. J Gen Intern Med 25 Suppl 1:50–55. https://doi.org/10.1007/s11606-009-1112-8

Hsu C-P, Chang C-W, Huang H-C, Chiang C-Y (2011) The relationships among social capital, organisational commitment and customer-oriented prosocial behaviour of hospital nurses. J Clin Nurs 20:1383–1392. https://doi.org/10.1111/j.1365-2702.2010.03672.x

Jakobsen MD, Aust B, Dyreborg J, et al (2016) Participatory organizational intervention for improved use of assistive devices for patient transfer: study protocol for a single-blinded cluster randomized controlled trial. BMC Musculoskelet Disord 17:501. https://doi.org/10.1186/s12891-016-1339-6

Jakobsen MD, Aust B, Kines P, et al (2019) Participatory organizational intervention for improved use of assistive devices in patient transfer: a single-blinded cluster randomized controlled trial. Scand J Work Environ Health 45:146–157. https://doi.org/10.5271/sjweh.3769

Jay K, Andersen LL (2018) Can high social capital at the workplace buffer against stress and musculoskeletal pain?: Cross-sectional study. Medicine (Baltimore) 97:e0124. https://doi.org/10.1097/MD.0000000000010124

Jensen JH, Flachs EM, Skakon J, et al (2018) Longitudinal associations between organizational change, work-unit social capital, and employee exit from the work unit among public healthcare workers: a mediation analysis. Scand J Work Environ Health. https://doi.org/10.5271/sjweh.3766

Kawachi I, Berkman LF (2001) Social ties and mental health. J Urban Health 78:458–467. https://doi.org/10.1093/jurban/78.3.458

Kilpatrick M, Sanderson K, Blizzard L, et al (2014) Workplace health promotion: what public-sector employees want, need, and are ready to change. J Occup Environ Med 56:645–651. https://doi.org/10.1097/JOM.0000000000000161

Kowalski C, Ommen O, Driller E, et al (2010) Burnout in nurses - the relationship between social capital in hospitals and emotional exhaustion. J Clin Nurs 19:1654–1663. https://doi.org/10.1111/j.1365-2702.2009.02989.x

Kukkurainen ML, Suominen T, Rankinen S, et al (2012) Organizational vision: experience at the unit level. J Nurs Manag 20:868–876. https://doi.org/10.1111/j.1365-2834.2011.01290.x

Long JC, Cunningham FC, Braithwaite J (2013) Bridges, brokers and boundary spanners in collaborative networks: a systematic review. BMC Health Serv Res 13:158. https://doi.org/10.1186/1472-6963-13-158

Mache S, Jensen S, Jahn R, et al (2015) Worksite Health Program Promoting Changes in Eating Behavior and Health Attitudes. Health Promot Pract 16:826–836. https://doi.org/10.1177/1524839915596310

Meng A, Clausen T, Borg V (2018) The association between team-level social capital and individual-level work engagement: Differences between subtypes of social capital and the impact of intra-team agreement. Scand J Psychol 59:198–205. https://doi.org/10.1111/sjop.12435

Oksanen T, Kouvonen A, Kivimäki M, et al (2008) Social capital at work as a predictor of employee health: multilevel evidence from work units in Finland. Soc Sci Med 66:637–649. https://doi.org/10.1016/j.socscimed.2007.10.013

Oksanen T, Kouvonen A, Vahtera J, et al (2010) Prospective study of workplace social capital and depression: are vertical and horizontal components equally important? J Epidemiol Community Health 64:684–689. https://doi.org/10.1136/jech.2008.086074

Rugulies R, Hasle P, Pejtersen JH, et al (2016) Workplace social capital and risk of long-term sickness absence. Are associations modified by occupational grade? Eur J Public Health 26:328–333. https://doi.org/10.1093/eurpub/ckv244

Salas E, DiazGranados D, Klein C, et al (2008) Does Team Training Improve Team Performance? A Meta-Analysis. Hum Factors 50:903–933. https://doi.org/10.1518/001872008X375009

Shea CM, Jacobs SR, Esserman DA, et al (2014) Organizational readiness for implementing change: a psychometric assessment of a new measure. Implementation Science 9:. https://doi.org/10.1186/1748-5908-9-7

Shin JI, Lee E (2016) The effect of social capital on job satisfaction and quality of care among hospital nurses in South Korea. J Nurs Manag 24:934–942. https://doi.org/10.1111/jonm.12401

Stajkovic AD, Lee D, Nyberg AJ (2009) Collective efficacy, group potency, and group performance: meta-analyses of their relationships, and test of a mediation model. J Appl Psychol 94:814–828. https://doi.org/10.1037/a0015659

Street TD, Lacey SJ (2018) Employee characteristics and health belief variables related to smoking cessation engagement attitudes. Work 60:75–83. https://doi.org/10.3233/WOR-182716

Strömgren M, Eriksson A, Bergman D, Dellve L (2016) Social capital among healthcare professionals: A prospective study of its importance for job satisfaction, work engagement and engagement in clinical improvements. Int J Nurs Stud 53:116–125. https://doi.org/10.1016/j.ijnurstu.2015.07.012

Sun X, Zhang N, Liu K, et al (2014) Effects of a randomized intervention to improve workplace social capital in community health centers in China. PLoS ONE 9:e114924. https://doi.org/10.1371/journal.pone.0114924

Török E, Clark AJ, Jensen JH, et al (2018) Work-unit social capital and long-term sickness absence: a prospective cohort study of 32 053 hospital employees. Occup Environ Med 75:623–629. https://doi.org/10.1136/oemed-2017-104954

Tsuboya T, Tsutsumi A, Kawachi I (2015) Change in psychological distress following change in workplace social capital: results from the panel surveys of the J-HOPE study. Occup Environ Med 72:188–194. https://doi.org/10.1136/oemed-2014-102427

Weiner BJ (2009) A theory of organizational readiness for change. Implement Sci 4:67. https://doi.org/10.1186/1748-5908-4-67

Wendler MC, Olson-Sitki K, Prater M (2009) Succession Planning for RNs: Implementing a Nurse Management Internship. JONA: The Journal of Nursing Administration 39:326–333. https://doi.org/10.1097/NNA.0b013e3181ae9692

TABLES

Table 1. Characteristics of study participants in the control and intervention groups. Values are reported as Mean (SD). There were no significant differences between the groups at baseline.

	Control		Intervention	
	Mean	SD	Mean	SD
N	309		316	
Females (n)	277		281	
Males (n)	32		35	
Age (years)	40	12	41.8	12.2

Table 2. Baseline values (least square mean), between-group (control – intervention) differences at follow up (6 and 12 months) and within group (0-6 months, 6-12 months and 0-12 months) differences for bonding, linking A and linking B social capital. Values are means (95% confidence interval).

			Mean	95CI Low	95CI High	P	Gr*T
Bonding	Baseline	Control	73.76	71.82	75.70	0.847	
		Intervention	73.47	71.24	75.71		
	Within-group differences at 0-6-months follow-up	Control	0.23	-1.92	2.38	0.836	
		Intervention	2.83	0.70	4.97	0.009	
	Within-group differences at 6-12-months follow-up	Control	0.62	-1.67	2.90	0.597	
		Intervention	0.32	-1.85	2.49	0.772	
	Within-group differences at 0-12-months follow-up	Control	0.84	-1.39	3.08	0.460	
		Intervention	3.15	0.87	5.43	0.007	
	Between-group differences at 6-months follow-up		1.91	-1.12	4.95	0.217	
	Between-group differences at 12-months follow-up		1.62	-1.60	4.83	0.325	0.192
Linking A	Baseline	Control	67.24	64.36	70.12	0.190	
		Intervention	69.96	67.09	72.83		
	Within-group differences at 0-6-months follow-up	Control	-0.90	-3.76	1.96	0.536	
		Intervention	-1.46	-4.30	1.37	0.312	
	Within-group differences at 6-12-months follow-up	Control	0.32	-2.72	3.36	0.837	
		Intervention	1.88	-0.98	4.74	0.197	
	Within-group differences at 0-12-months follow-up	Control	-0.58	-3.55	2.38	0.699	
		Intervention	0.42	-2.62	3.46	0.786	
	Between-group differences at 6-months follow-up		2.77	-1.39	6.92	0.192	
	Between-group differences at 12-months follow-up		4.33	-0.06	8.71	0.053	0.761
Linking B	Baseline	Control	65.62	63.31	67.94	0.084	
		Intervention	68.54	66.15	70.93		
	Within-group differences at 0-6-months follow-up	Control	-0.37	-2.91	2.17	0.775	
		Intervention	-1.12	-3.64	1.39	0.381	
	Within-group differences at 6-12-months follow-up	Control	-0.18	-2.89	2.53	0.898	
		Intervention	2.70	0.15	5.25	0.038	
	Within-group differences at 0-12-months follow-up	Control	-0.55	-3.18	2.09	0.684	
		Intervention	1.58	-1.11	4.27	0.250	
	Between-group differences at 6-months follow-up		2.55	-0.99	6.10	0.158	
	Between-group differences at 12-months follow-up		5.43	1.67	9.19	0.005	0.299

Gr*T: *Group*×*time* interaction

Table 3. Baseline values (least square mean), between-group (control – intervention) differences at follow up (6 and 12 months) and within group (0-6 months, 6-12 months and 0-12 months) differences for organizational readiness for change (ORC). Values are means (95% confidence interval).

			Mean	95CI Low	95CI High	P	Gr*T
ORC	Baseline	Control	70.72	68.22	73.22	0.036	
		Intervention	66.81	64.14	69.48		
	Within-group differences at 0-6-months follow-up	Control	-1.02	-4.63	2.58	0.577	
		Intervention	2.95	-0.56	6.46	0.100	
	Within-group differences at 6-12-months follow-up	Control	0.47	-3.48	4.42	0.816	
		Intervention	1.47	-2.26	5.19	0.441	
	Within-group differences at 0-12-months follow-up	Control	-0.55	-4.32	3.22	0.773	
		Intervention	4.41	0.63	8.19	0.022	
	Between-group differences at 6-months follow-up		-0.39	-4.46	3.68	0.852	
	Between-group differences at 12-months follow-up		0.61	-3.85	5.07	0.789	0.136

Gr*T: *Group*×*time* interaction

FIGURE LEGENDS

Figure 1. Flow-chart of the number of clusters, study participants, push-buttons and accelerometers throughout the study.