



Perceived Collective Use of Selection, Optimisation, and Compensation: Associations with Work Ability¹

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ABSTRACT

Background: Individual use of selection, optimisation, and compensation (SOC) is positively associated with work ability; however, this association has never been explored at the group or leadership levels.

Aim: The aim of this study is to explore the strength of associations between employee-rated use of SOC at the individual, group, and leadership levels and self-rated work ability among nurses.

Method: A random sample of 2000 nurses were invited to participate in a questionnaire survey, among whom 785 responded.

Results: Employee-rated use of SOC at the individual and group levels was positively associated with self-rated work ability when controlling for psychosocial working environment factors and health. The association was strongest at the group level.

Conclusion: Efforts to enhance the collective use of SOC may prove beneficial to maintain the work ability of nurses and retain them in the profession.

KEYWORDS

Occupational health and safety / Occupational psychology / Retention of nurses / SOC / Sustainable workplaces

Introduction

In light of the Covid-19 pandemic, the shortage of nurses has become even more evident worldwide (WHO 2020) and the need to retain both older and younger nurses in their jobs is increasingly salient. The shortage of nurses has also been the centre of a political debate in Denmark on challenges and solutions to the problem (DSR, 2021). Reduced work ability is associated with early retirement, intention to leave the job, and risk of disability (Fisher et al. 2016), and lower scores on the work ability index has been found to be associated with intention to leave the nursing profession, particularly among

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younger nurses (Camerino *et al.* 2006). These findings emphasise the importance of maintaining the work ability of nurses throughout their careers in order to secure the retention of nurses. The use of selection, optimisation, and compensation strategies (SOC) has been found to be positively associated with work ability and job performance across job groups (Mauno *et al.* 2020; Riedel *et al.* 2015; Sottimano *et al.* 2019; Weber *et al.* 2018; Yeung & Fung 2009) and among nurses (Baethge *et al.* 2016; Müller *et al.* 2012; von Bonsdorff *et al.* 2014; Žmauc *et al.* 2019). The association between the use of SOC and work ability has not only been found to be stronger among older nurses (Müller *et al.* 2012) but also to be stronger among younger nurses (von Bonsdorff *et al.* 2014). These findings indicate that the use of SOC strategies is beneficial for the work ability of nurses throughout their careers and thus may contribute to the retention of nurses.

The SOC model is a life span model on how people can age successfully through the use of selection, optimisation, and compensation strategies (Baltes & Baltes 1990), and it has been applied to the work context (e.g., Abraham & Hanson 1995; Müller *et al.* 2018; Segura-Camacho *et al.* 2018). *Selection* refers to the setting and prioritisation of goals as a response to an actual or expected reduction in resources. The model distinguishes between *elective selection*, which refers to the voluntary selection or prioritisation of goals based on personal preferences and motives and *loss-based selection*, which refers to the involuntary abandonment of goals. *Optimisation* refers to allocation of resources and the investment of means to reach the goal. *Compensation* refers to the use of external resources or alternative means to reach the goal (Baltes & Baltes 1990).

Work ability refers to the balance between an individual's resources and the required job demands (Ilmarinen *et al.* 1997). From the perspective of the Conservation of Resources (COR) theory (Hobfoll 1989), SOC may be regarded as behaviour that enables a more efficient and adaptive use of the available employee-resources, contributing to the occupational well-being of the individual. Throughout the lifespan, employees may experience a reduction in resources due to ageing, illness, or life events such as divorce or other challenging events. Furthermore, it has been argued that modern work life is characterised by intensified job demands (Kubicek *et al.* 2014). These factors may all lead to an imbalance between job demands and mental and/or physical resources in employees. The more efficient and adaptive use of resources, when applying SOC strategies, may thus help prevent imbalance or restore the balance between job demands and employee-resources, contributing to the maintenance of the work ability. Job control has been found to be an important job resource, and research indicates that employees use this job resource to apply SOC strategies to enhance work ability (Müller *et al.* 2012; Riedel *et al.* 2015). All in all, SOC strategies may be applied as a response to limited resources associated with developmental changes or external changes, such as societal or organisational changes or life events to balance out job demands and employee-resources, and thereby maintaining the work ability throughout the career.

So far, research has primarily explored the individual's use of SOC strategies and how this is associated with various work-related outcomes. However, for decades, scholars in the field have encouraged research exploring the use of selection, optimisation, and compensation beyond the individual level (Baltes & Dickson 2001; Baltes & Carstensen 1999; Moghimi *et al.* 2019; Moghimi *et al.* 2017; Müller *et al.* 2015). Baltes and Carstensen (1999) argue that when individuals aim to use SOC at the personal level, they inevitably have to consider group processes that may affect the implementation of these strategies. At the same time, by using collective SOC, members of the social group can contribute

in defining goals (selection), in providing improved means (optimisation), and in offering alternative means when the individuals' own fail (compensation), potentially leading to higher levels of functioning for all members of the social group (Baltes & Carstensen 1999). In other words, the social context can both pose limitations for the individual's use of SOC strategies but, at the same time, provide unique opportunities for the use of a wider range of SOC strategies benefitting all members of the social group. More extensive use of collective SOC may express high levels of social capital and social support. Social capital has been found to be negatively associated with depression (Kouvonen et al. 2008) and burnout (Kowalski et al. 2010), and increase in the social capital within teams and in the relation with the immediate manager have been found to be positively associated with work performance (Clausen, Meng, et al. 2019), and may thus in itself be beneficial for the self-rated work ability of the individual employee. It may be that high levels of social capital facilitate the use of collective SOC, similar to the way job control appears to facilitate the individual employee's use of SOC to enhance the work ability. The collective use of SOC strategies can, therefore, be expected to be associated with the work ability of the employees.

A workplace can typically be regarded as a social system, where the individual employees are dependent on each other and the cooperation with their manager in the everyday performance of their work tasks. Therefore, it is to be expected that both individual and collective SOC strategies are used in workplaces. Nordic workplaces are characterised by relatively high levels of influence and employee participation in decision making processes and a widespread use of organising the employees into groups (Sørensen et al. 2012). This may imply that group processes and good cooperation between colleagues and between managers and employees are even more salient for positive work outcomes. This raises the question of whether the use of SOC strategies at the various organisational levels all are of equal importance for work-related outcomes, both in a Nordic context and beyond. This knowledge will expand our understanding of factors affecting important work-related outcomes such as work ability and will help inform targeted interventions to improve these outcomes, which may contribute to the retention of employees.

The aim of the present study was, therefore, to take the first step in this new direction of research, and explore the strength of associations between employee-rated use of SOC strategies, at the individual, group, and leadership levels and self-rated work ability among Danish nurses.

Methods

Participants and data collection

We applied a cross-sectional survey design. A random sample of 2000 members of the Danish Nurses Organisation were selected for the study. The inclusion criteria were nurses who were currently employed at public hospitals. Of the random sample, 1966 had valid e-mail addresses and were invited to participate by e-mail. The mail included a description of the study and a link to the online questionnaire. The data was collected in April 2018. To ensure the highest possible response rate, reminders were sent out twice. Of the 1966 invited participants, 850 responded to the questionnaire corresponding to a response rate of 43%. We excluded 65 of these for the following reasons: 16 had only responded to the first two screening questions, eight were temporarily unemployed,



25 were not working as nurses, and 16 were not employed at public hospitals. Thus, the total sample consisted of 785 nurses employed at public hospitals.

Measures

SOC

To measure the employee-rated use of SOC at the individual, group, and leadership levels, we used a newly developed SOC questionnaire (Meng *et al.* 2021). Results from the validation of the questionnaire revealed that the nine-factor model had the best fit indicating that each of the subscales measures a unique concept and that it is meaningful to measure SOC at the three organisational levels (Meng *et al.* 2021).

SOC at the individual level (I-SOC) was measured with a total of 11 items, four measuring selection (e.g., If I feel under pressure, I deselect less important tasks), four measuring optimisation (e.g., I usually make sure to use ergonomically correct working postures), and three measuring compensation (e.g., If I have troubles causing difficulties in performing some of my work tasks, I ask my colleagues for help). The scale had a Cronbach's alpha of 0.69. The three subscales had the following Cronbach's alphas: Selection (IS) 0.56, optimisation (IO) 0.60, compensation (IC) 0.51.

SOC at the group level (G-SOC) was measured with a total of nine items, three measuring selection (e.g., If we are under pressure, we jointly prioritise the work tasks in the group), three measuring optimisation (e.g., In my group, we share new work-related knowledge with each other), and three measuring compensation (e.g., If someone in the group has troubles causing difficulties in performing some of his/her work tasks, a colleague will help carrying out the tasks). This scale had a Cronbach's alpha of 0.88. The three subscales had the following Cronbach's alphas: Selection (GS) 0.81, optimisation (GO) 0.61, compensation (GC) 0.81.

SOC at the leadership level (L-SOC) was measured with a total of nine items, three measuring selection (e.g., My immediate manager helps prioritising work tasks if an employee is under a lot of pressure), three measuring optimisation (e.g., My immediate manager encourages the employees to use ergonomically correct working postures), and three measuring compensation (e.g. If an employee has difficulties performing some of his/her work tasks, my immediate manager will arrange for someone to help the employee with the work tasks). This scale had a Cronbach's alpha of 0.90. The three subscales had the following Cronbach's alphas: Selection (LS) 0.77, optimisation (LO) 0.77, compensation (LC) 0.80.

All items in the SOC scales are presented in Appendix 1.

All items had a five-point Likert type scale ranging from 1 = 'not at all/to a very low extent' to 5 = 'to a very large extent' as response options. For the analyses, the responses were recoded into a scale ranging from 0 to 100.

Work ability

Work ability was measured with two questions 'how would you rate your current work ability in regards to the *physical/psychological* (respectively) demands at your

work?’ adapted from the Work Ability Index (WAI) (Ilmarinen, 2006). The participants responded on a five-point Likert type scale ranging from 1 = ‘bad’ to 5 = ‘excellent’. For the analyses, the responses were recoded into a scale ranging from 0 to 100 and the mean of the two items was calculated for each participant.

Control variables

Health

Poor health has been found to be negatively associated with work ability (Koolhaas et al. 2014; van den Berg et al. 2017), and previous research has found a positive association between perceived health and the use of SOC strategies (Yeung & Fung 2009). We, therefore, controlled for health in the analyses. The participants were asked to rate their health on a five-point Likert type scale ranging from 1 = ‘bad’ to 5 = ‘excellent’. In the analyses, the responses were recoded into a scale ranging from 0 to 100.

Job control

The results from a meta-analysis show that there is a positive association between job control and the use of SOC (Moghimi et al. 2017). Research has also found a positive association between job control and work ability and interaction effects between SOC use and job control (Riedel et al. 2015; Sottimano et al. 2019). Based on these findings, we decided to control for job control in the analyses. We measured job control with the following two items from the Danish Psychosocial Questionnaire (DPQ) (Clausen, Madsen, et al. 2019): ‘Do you have any influence on how you solve your work tasks?’ and ‘Do you have any influence on in which order you solve your work tasks?’. The items had a five-point Likert type scale ranging from 1 = ‘not at all/to a very low extent’ to 5 = ‘to a very large extent’ as response options. In the analyses, the responses were recoded into a scale ranging from 0 to 100.

Job demands

Research has found a negative association between quantitative job demands and the use of SOC strategies (Abraham & Hanson 1995; Baltes & Heydens-Gahir 2003) and a negative association between quantitative job demands and work ability (Riedel et al. 2015). Therefore, we controlled for job demands in the analyses. We included two aspects of job demands: Quantitative demands and work pace. Quantitative demands were measured with four items from the Danish DPQ (Clausen, Madsen, et al. 2019) (e.g., ‘How often is it the case that you do not have time to complete all your work tasks?’) (Cronbach’s alpha 0.77), and work pace was measured with the item ‘Do you have to work very fast?’, also from the Danish DPQ. Respondents answered on a five-point Likert type scale ranging from 1 = always to 5 = never/hardly ever. In the analyses, the responses were recoded into a scale ranging from 0 to 100. The higher value, the less job demands.

Social capital

As mentioned in the Introduction, it is plausible that the quality of the relationship between colleagues and between employees and the immediate manager will affect the use of collective SOC. Therefore, we also controlled for social capital between colleagues



and in relation to the immediate manager. Social capital was measured with two single items from the Danish DPQ (Clausen, Madsen, et al. 2019) ‘Is the relationship between your immediate manager and the employees characterised by mutual respect and recognition?’ and ‘Is there a feeling of togetherness and cohesion between you and your colleagues?’. Both items had a five-point Likert type scale ranging from 1 = ‘not at all/to a very low extent’ to 5 = ‘to a very large extent’ as response options. For the analyses, the responses were recoded into a scale ranging from 0 to 100.

Ethical considerations

In the invitation mail, the participants were informed about the content of the questionnaire, how the data would be handled, and about the purpose of the study. They thereby provided informed consent to participate in the study when they chose to continue to the electronic questionnaire.

In addition, the data collection and handling was approved by the internal board at the authors’ institution (approval reference: rev: 01.12.2016).

Data analysis

To investigate the association between employee-rated SOC use at the individual, group, and leadership levels and work ability, we used linear regression analysis. First, we tested three models. In Model 1, we investigated the association between each of the three SOC scales (I-SOC, G-SOC, L-SOC) and work ability controlling for age and gender. In Model 2, we added the control variables job control, quantitative demands, work pace, and social capital. In Model 3, we further controlled for health. Next, we mutually controlled for the three SOC scales in three models: Model 4, where we also controlled for age and gender, Model 5 where we added the variables related to the psychosocial working environment and Model 6, where we further included health. Lastly, we explored the associations between the three subscales of each of the three SOC scales and work ability using the same approach as in Model 4–6. So, first mutually controlling for the three subscales as well as age and gender (Model 7), then adding the variables related to the psychosocial working environment (Model 8), and finally, including health as well (Model 9). Because all the scales ranged from 0 to 100, we report the unstandardized beta values. As summarised in Table 1, some of the study variables were strongly correlated, so we checked for multicollinearity using the following criteria: The maximum VIF should not be greater than 10; the average VIF should not be substantially greater than 1; the minimum tolerance should not be below 0.2 (Field 2013). SPSS version 20 was used to analyse the data.

Results

The mean age of the 785 participants was 47 years (SD 12) ranging from 23 to 70 years, 85% were women, 4% were men, and 11% did not report their gender. Of the participants, 26% worked at surgical wards, 29% at medical wards, 18% at psychiatric wards, and 33% at ‘other wards’, including X-ray, intensive care units, hospice, emergency, and administration.

Table 1 Mean, standard deviations, and Pearson's R for all study variables

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1. Work ability	63.5	19.5	1																			
2. L-SOC – leadership level	56.3	19.1	0.29	1																		
3. Selection (LS)	53.7	21.6	0.28	0.92	1																	
4. Optimisation (LO)	58.8	21.3	0.23	0.85	0.66	1																
5. Compensation (LC)	56.5	21.3	0.28	0.90	0.80	0.62	1															
6. G-SOC – group level	61.7	15.5	0.41	0.47	0.42	0.42	1															
7. Selection (GS)	60.6	18.4	0.35	0.39	0.35	0.33	0.35	0.92	1													
8. Optimisation (GO)	67.0	15.8	0.34	0.41	0.36	0.42	0.33	0.82	0.64	1												
9. Compensation (GC)	57.4	18.8	0.37	0.44	0.40	0.36	0.41	0.89	0.75	0.56	1											
10. I-SOC – Individual level	54.1	10.9	0.33	0.35	0.31	0.33	0.30	0.53	0.47	0.46	0.47	1										
11. Selection (IS)	47.9	14.1	0.14	0.23	0.22	0.16	0.23	0.27	0.26	0.19	0.25	0.72	1									
12. Optimisation (IO)	60.2	13.1	0.41	0.36	0.31	0.39	0.27	0.50	0.40	0.51	0.42	0.68	0.23	1								
13. Compensation (IC)	54.2	16.7	0.22	0.22	0.17	0.21	0.19	0.43	0.39	0.34	0.39	0.82	0.39	0.37	1							
14. Job control	65.0	20.7	0.38	0.40	0.36	0.33	0.38	0.33	0.29	0.22	0.35	0.30	0.14	0.25	0.27	1						
15. Quantitative demands	36.0	16.1	0.23	0.18	0.18	0.14	0.15	0.18	0.16	0.14	0.17	0.21	0.14	0.23	0.12	-0.02	1					
16. Work pace	31.6	19.5	0.27	0.17	0.16	0.14	0.15	0.18	0.16	0.11	0.18	0.24	0.13	0.26	0.16	0.22	0.60	1				
17. Social capital manager	63.9	25.3	0.30	0.62	0.55	0.54	0.57	0.31	0.26	0.31	0.24	0.20	0.11	0.26	0.10	0.39	0.10	0.16	1			
18. Social capital colleagues	72.8	19.6	0.26	0.25	0.22	0.23	0.22	0.47	0.43	0.41	0.40	0.25	0.16	0.23	0.18	0.29	0.08	0.09	0.29	1		
19. Health	58.8	20.5	0.50	0.18	0.15	0.13	0.21	0.19	0.14	0.19	0.17	0.20	0.07	0.18	0.20	0.24	0.11	0.12	0.13	0.14	1	

Quantitative demands and work pace was scored so that higher score equals less demands. $n = 516$. All correlations are significant at the $p < 0.01$ level except: between compensation at the group level (9) and social capital in relation to the immediate manager (17) and between quantitative demands (15) and social capital among colleagues (18) which were significant at the $p < 0.05$ level; and the correlation between job control (14) and quantitative demands (15) and between selection at the individual level (11) and health (19) that were not significant ($p = 0.347$ and $p = 0.065$, respectively).



The mean, standard deviations, and the Pearson's correlations between study variables are shown in Table 1. Of the three SOC scales, SOC at the group level had the highest mean score indicating greater use of SOC at this organisational level. As shown in Table 1, the three SOC scales and the control variables were all significantly associated with work ability. Health was the variable with the strongest correlation with work ability. In addition, for all three SOC scales, the subscales were strongly correlated with the overall scale, particularly L-SOC and G-SOC. Furthermore, the correlations were also strong between quantitative job demands and work pace and between the social capital in the relation to the immediate manager and L-SOC.

As shown in Model 1 in Table 2, all three SOC scales [Leadership (L-SOC), Group (G-SOC), Individual (I-SOC)] were positively and significantly associated with work ability when controlling for gender and age. When additionally controlling for job

Table 2 Results of regression for the three subscales separately with work ability as the dependent variable

	Model 1			Model 2			Model 3		
	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>
L-SOC – Leadership level (<i>n</i> = 661)	.299	.039	.000	.033	.046	.470	-.005	.041	.912
Job control	–	–	–	.253	.038	.000	.180	.034	.000
Quantitative demands	–	–	–	.263	.054	.000	.204	.048	.000
Work pace	–	–	–	.089	.045	.048	.091	.040	.022
Social capital Leader	–	–	–	.094	.035	.008	.089	.031	.004
Social capital colleagues	–	–	–	.115	.037	.002	.096	.033	.003
Health	–	–	–	–	–	–	.410	.031	.000
G-SOC – Group level (<i>n</i> = 629)	.530	.047	.000	.307	.052	.000	.261	.047	.000
Job control	–	–	–	.192	.038	.000	.124	.034	.000
Quantitative demands	–	–	–	.228	.053	.000	.176	.048	.000
Work pace	–	–	–	.095	.044	.032	.086	.040	.030
Social capital Leader	–	–	–	.065	.030	.030	.062	.027	.021
Social capital colleagues	–	–	–	.040	.039	.313	.026	.035	.453
Health	–	–	–	–	–	–	.393	.031	.000
I-SOC – Individual level (<i>n</i> = 567)	.578	.073	.000	.294	.073	.000	.213	.066	.001
Job control	–	–	–	.207	.040	.000	.150	.036	.000
Quantitative demands	–	–	–	.174	.058	.003	.131	.052	.012
Work pace	–	–	–	.069	.048	.153	.075	.043	.085
Social capital Leader	–	–	–	.097	.032	.002	.092	.028	.001
Social capital colleagues	–	–	–	.106	.039	.007	.076	.035	.032
Health	–	–	–	–	–	–	.386	.033	.000

Model 1: control for gender and age. R^2 : L-SOC 0.091; G-SOC 0.178; I-SOC 0.103

Model 2: control for work environment as well. ΔR^2 : L-SOC 0.182; G-SOC 0.117; I-SOC 0.147

Model 3: control for health as well. ΔR^2 : L-SOC 0.157; G-SOC 0.143; I-SOC 0.149

Note 1: Test for multicollinearity: Leadership level: max.VIF 1.770; mean VIF 1.22; minimum tolerance 0.316.

Group level: max.VIF 1.676; mean VIF 1.18; minimum tolerance 0.597. Individual level: max.VIF 1.739; mean VIF 1.30; minimum tolerance 0.575.



control, quantitative demands, work pace, and social capital, the strength of associations between the SOC scales and work ability were reduced and SOC at the leadership level was no longer significantly associated with work ability (Model 2 in Table 2). When further controlling for health, the strength of association between the SOC scales and work ability was further reduced, but both SOC at the group and individual levels remained significantly associated with work ability (Model 3 in Table 2).

The test for multicollinearity showed that it was not a problem for the analyses (see note 1 under Table 2).

Table 3 Result of regression when mutually controlling for the three SOC scales with work ability as the dependent variable

	Model 4			Model 5			Model 6		
	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>
L-SOC	.115	.047	.014	-.055	.054	.316	-.075	.049	.127
G-SOC	.344	.064	.000	.265	.065	.000	.225	.059	.000
I-SOC	.270	.085	.002	.177	.082	.032	.113	.075	.132
Job control	–	–	–	.212	.043	.000	.147	.039	.000
Quantitative demands	–	–	–	.179	.060	.003	.135	.055	.013
Work pace	–	–	–	.072	.049	.145	.070	.045	.118
Social capital Leader	–	–	–	.095	.039	.014	.102	.035	.004
Social capital colleagues	–	–	–	.027	.044	.545	.013	.040	.739
Health	–	–	–	–	–	–	.363	.034	.000

n = 514

Model 4: control for gender and age. *R*²: 0.198

Model 5: control for work environment as well. ΔR^2 : 0.091

Model 6: control for health as well. ΔR^2 : 0.132

Note 1: Test for multicollinearity: max VIF 2.000; mean VIF 1.52; minimum tolerance 0.499

Next, we explored the association between the three SOC scales and work ability when mutually controlling for the three scales. All three scales were significantly associated with work ability when only controlling for age and gender as well (Model 4 in Table 3). When additionally controlling for the psychosocial work environment variables, only SOC at the group and individual level remained significantly associated with work ability (Model 5 in Table 3). When further adding health to the regression, only SOC at the group level remained significantly associated with work ability (Model 6 in Table 3).

Again, multicollinearity was not an issue in the analysis (see note 1 under Table 3).

Lastly, we wanted to explore the association between selection, optimisation and compensation, respectively, with work ability at the three organisational levels.

At the leadership level, only selection was significantly associated with work ability, when mutually controlling for the subscales and including age and gender (Model 7 in Table 4). When adding the factors related to the psychosocial working environment (job control, quantitative demands, work pace, and social capital), the strength of association was reduced for all subscales and none of them were significantly associated with work ability (Model 8 in Table 4). When adding health to the analysis, the strength of association between selection and work ability increased a bit and regained its statistical significance (Model 9 in Table 4).



Table 4 Results of regression mutually controlling for the three subscales for the three SOC scales with work ability as the dependent variable

	Model 7			Model 8			Model 9		
	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>
Leadership level (<i>n</i> = 661)									
Selection (LS)	.175	.060	.004	.087	.055	.114	.098	.049	.045
Optimisation (LO)	.055	.048	.249	-.032	.044	.463	-.032	.039	.421
Compensation (LC)	.063	.061	.302	-.028	.056	.612	-.080	.050	.109
Job control	–	–	–	.255	.038	.000	.181	.034	.000
Quantitative demands	–	–	–	.258	.054	.000	.198	.048	.000
Work pace	–	–	–	.090	.045	.046	.092	.040	.020
Social capital leader	–	–	–	.097	.035	.006	.092	.031	.003
Social capital colleagues	–	–	–	.115	.037	.002	.096	.033	.003
Health	–	–	–	–	–	–	.413	.031	.000
Group level (<i>n</i> = 629)									
Selection (GS)	.136	.064	.035	.045	.061	.458	.075	.054	.168
Optimisation (GO)	.200	.061	.001	.165	.058	.005	.091	.052	.082
Compensation (GC)	.200	.060	.001	.111	.057	.051	.096	.051	.060
Job control	–	–	–	.196	.038	.000	.124	.035	.000
Quantitative demands	–	–	–	.227	.053	.000	.176	.048	.000
Work pace	–	–	–	.099	.044	.026	.087	.040	.029
Social capital leader	–	–	–	.063	.030	.039	.062	.027	.022
Social capital colleagues	–	–	–	.038	.040	.337	.027	.035	.454
Health	–	–	–	–	–	–	.393	.032	.000
Individual level (<i>n</i> = 567)									
Selection (IS)	.018	.057	.755	-.028	.053	.595	-.003	.048	.943
Optimisation (IO)	.565	.064	.000	.381	.063	.000	.345	.056	.000
Compensation (IC)	.088	.051	.087	.032	.048	.513	-.029	.043	.499
Job control	–	–	–	.200	.039	.000	.146	.036	.000
Quantitative demands	–	–	–	.168	.057	.003	.123	.051	.016
Work pace	–	–	–	.055	.047	.244	.062	.042	.140
Social capital leader	–	–	–	.079	.031	.013	.073	.028	.010
Social capital colleagues	–	–	–	.097	.039	.012	.068	.035	.052
Health	–	–	–	–	–	–	.383	.032	.000

Model 7: control for gender and age. R²: Leadership level 0.094; Group level 0.179; Individual level 0.164

Model 8: control for work environment as well. ΔR^2 : Leadership level 0.182; Group level 0.118; Individual level 0.118

Model 9: control for health as well. ΔR^2 : Leadership level 0.158; Group level 0.141; Individual level 0.145

Note 1: Test for multicollinearity: Leadership level: max.VIF 3.166; mean VIF 1.75; minimum tolerance 0.316. Group level: max.VIF 2.759; mean VIF 1.46; minimum tolerance 0.362. Individual level: max.VIF 1.745; mean VIF 1.15; minimum tolerance 0.573.

At the group level, all subscales were significantly associated with work ability when mutually controlling for the subscales and age and gender as well (Model 7 in Table 4). When adding the factors related to the psychosocial working environment, selection was no longer significantly associated with work ability and the association between compensation and work ability was only borderline significant (Model 8 in Table 4). When further adding health, the strength of all associations was further reduced and none of them remained significant (Model 9 in Table 4).

At the individual level, when mutually controlling for the subscales and age and gender, only optimisation was significantly associated with work ability (Model 7 in Table 4). When further controlling for the factors related to the psychosocial working environment, the strength of association between optimisation and work ability was reduced but remained significant (Model 8 in Table 4). When further adding health, the strength of association between optimisation and work ability was further reduced but remained significant (Model 9 in Table 4).

Again, multicollinearity was not a problem for these analyses (see note 1 under Table 4).

Discussion

The aim of the study was to explore the strength of associations between employee-rated use of SOC strategies at the individual, group, and leadership levels and self-rated work ability among Danish nurses. The results showed that employee-rated use of SOC strategies at the individual, group, and leadership levels were all positively associated with self-rated work ability among nurses. When controlling for the psychosocial work environment factors and health, the strength of associations between the SOC scales and work ability were reduced and was no longer significant at the leadership level. When mutually controlling for the three SOC scales, only SOC at the group level remained significantly associated with self-rated work ability in the full model. Finally, when exploring the association between the subscales for selection, optimisation, and compensation and work ability, at the three organisational levels, the results showed different patterns at the different organisational levels.

The results of the regression analyses for all three SOC scales showed that health had the strongest association with self-rated work ability (see Table 2), providing support for previous findings showing that health is associated with work ability (Koolhaas et al. 2014; van den Berg et al. 2017).

Looking at the three SOC scales, SOC at the leadership level was not significantly associated with self-rated work ability when controlling for the psychosocial working environment factors and health. Thus, SOC at the leadership level does not appear to contribute to the self-rated working ability of the employees beyond other important psychosocial working environmental factors and health. SOC at the leadership level and social capital in relation to immediate manager showed a strong inter-correlation (see Table 1). Although this did not pose a problem with multicollinearity in the analyses, this strong correlation could indicate that they do share a substantial part of the variance explained. This may explain why SOC at the leadership level not being significantly associated with work ability. Further research into the interplay between leadership and/or social capital in the relation to the immediate manager and SOC at the leadership



level, ideally in a larger sample, may provide important knowledge on how managers can support the work ability of the employees.

SOC at the group level was significantly associated with self-rated work ability beyond the psychosocial working environment factors and health, indicating that the use of collective SOC in work groups in itself is associated with the employees' self-rated work ability. Interestingly, social capital among the colleagues was not significantly associated with work ability in this analysis, indicating that it does not explain more of the variance in job ability beyond that explained by SOC at the group level. Social capital among colleagues and SOC at the group level were quite strongly correlated, so it could be that social capital does indeed facilitate the use of collective SOC, benefitting the work ability of the individual colleagues in the group.

SOC at the individual level was also significantly associated with self-rated work ability beyond the psychosocial working environment factors and health, providing support for previous research finding an association between individual use of SOC and work ability (Müller, Weigl, Heiden, Glaser, *et al.* 2012; Müller, Weigl, Heiden, Herbig, *et al.* 2012; Riedel *et al.* 2015; Sottimano *et al.* 2019; von Bonsdorff *et al.* 2014; Weber *et al.* 2018; Žmauc *et al.* 2019).

When mutually controlling for the three SOC scales, SOC at the leadership level was no longer associated with self-rated work ability when controlling for the psychosocial working environment factors (job control, quantitative demands, work pace, and social capital), and when controlling for health as well, only SOC at the group level remained significantly associated with work ability. These findings indicate that SOC at the group level may be of greater importance for work ability than SOC at the individual and particularly leadership level among Danish nurses.

Together, these results indicate that SOC at the individual and particularly group level may help maintain the balance between employee-resources and job demands of the individual employees contributing to maintaining their work ability (Ilmarinen *et al.* 1997). The fact that the collective use of SOC at the group level had the strongest association with work ability may reflect the Nordic approach to organisational structure, where the employees are organised into groups with high levels of influence on decisions and participation in the organisation of the work (Sørensen *et al.* 2012). This may facilitate the use of collective SOC, where the employees have the freedom to organise the work tasks in a way that takes into account their respective strengths and weaknesses or resources benefitting all members of the group (Baltes & Carstensen 1999). At the same time, the individual employees may be more dependent on the use of collective SOC in the group to balance out employee-resources and job demands, because the organisation of the work tasks and the performance of the work tasks are done in cooperation between the colleagues, perhaps making the use of SOC at the individual and leadership levels less salient.

When exploring the association between selection, optimisation, and compensation at the three organisational levels on the one side and work ability on the other side, the results revealed different patterns at the three organisational levels. At the leadership level, selection appeared to be the most important SOC strategy. Although the overall SOC scale at the leadership level lost significance when controlling for the psychosocial working environment factors and health, selection actually regained its significant association with work ability when health was included in the analysis. It could be that optimisation and compensation, such as reminding each other to use assistive devices and work ergonomically correct and help each other with work tasks, in this Nordic context

of organisation into independent groups (Sørensen et al. 2012), has a larger effect on the work ability when applied at the group level. However, selection at the leadership level was operationalised as the manager helping prioritising work tasks if an employee is under a lot of pressure and finding other types of work tasks when an employee cannot manage current work tasks. These strategies may be beyond the decision authority of work-group members, although likely to be relevant for the work ability of employees experiencing difficulties performing their work tasks.

At the group level, only optimisation was significantly associated with work ability, while compensation was borderline significant when controlling for the psychosocial working environment, and when including health in the analysis as well, none of the subscales were significantly associated with work ability. This finding may seem surprising because the overall SOC scale at the group level was the scale that had the strongest association with work ability of the three SOC scales. As highlighted by Moghimi et al. (2017), the components of SOC (selection, optimisation, and compensation) are often used in a coordinated way representing a combined and orchestrated process. This may be even more salient at the group level, because more different strategies may be needed to take into account the various strengths and weaknesses of the individual members of the group to maintain or restore the balance between employee-resources and job demands. Therefore, the combined use of all three types of strategies may provide the most effective and adaptive use of the resources within the group contributing to the work ability of all of the group members.

At the individual level, only optimisation was significantly associated with work ability, and it remained significant in all three models. Optimisation was operationalised as making use of assistive devices and using ergonomically correct working positions as well as putting effort into learning new things that are important for one's work and taking the breaks one needs. While selection is about organising work tasks and compensation asking for help or assistive devices and finding other ways to perform the work tasks. Thus, it may be that optimisation, at the individual level, is the most effective way to preserve one's resources while selection and compensation may be more effective in the social context of the group of colleagues or in cooperation with the manager.

Implications of the results

The results show that there is an association between the employee-rated use of SOC strategies at the individual and group levels and self-rated work ability among nurses. Higher levels of work ability have been found to be associated with the retention of nurses (Camerino et al. 2006). These findings suggest that it may prove beneficial to enhance the use of SOC among nurses in efforts to retain nurses. Particularly, SOC at the group level was associated with the self-rated work ability of the nurses. The collective use of SOC may express high levels of support and social capital at the workplace. The psychosocial work environment has been found to be an important factor in the turnover of eldercare workers (Clausen et al. 2012), and more specifically, lack of support both from managers and colleagues have been pointed out as important reasons among nurses to leave the profession (Tuckett et al. 2015). One of the mechanisms behind this association may be that the lack of support leads to less use of collective SOC strategies at the workplace, which is associated with reduced work ability, which again is



associated with higher risk of the nurses leaving the profession. Therefore, efforts to enhance social support and social capital at healthcare workplaces may prove beneficial to enhance the use of collective SOC strategies and thereby contribute to the retention of nurses. Considering the approach to organisational structure in Nordic countries, where the employees are organised into groups with high levels of influence on decisions and participation in the organisation of the work (Sørensen *et al.* 2012), enhancing the use of collective SOC in the groups may be of particular relevance in Nordic countries.

Limitations and strengths

A strength of the study is that it is the first to explore the employee-rated use of SOC at the group and leadership levels, and thus provide new insight into factors associated with nurses' work ability.

A limitation of the study is that the analyses were based on cross-sectional data and therefore do not allow for conclusions on the direction of the associations found. Based on these data, it cannot be ruled out that workers with higher levels of work ability have more resources to use SOC strategies. Further research is needed to establish whether the associations found reflect a causal relationship where the use of SOC has an impact on the work ability of the workers.

Another limitation of the study is that all data were self-reported posing the risk of common method bias (Podsakoff *et al.* 2003), which may inflate the strength of the associations found. However, the beta values were relatively modest, indicating that common method bias was not the sole explanation for the associations found. Nevertheless, future studies are encouraged to include other than self-rated measures of work ability to confirm the results.

Although the response rate of 43% corresponds to the average now a days (Stedman *et al.* 2019), we did not have any information about the individuals who did not respond to the questionnaire. We, therefore, cannot rule out selection bias. It could be that the more healthy nurses with higher work ability were more likely to participate in the survey, posing a healthy worker effect (McMichael 1976), but it could also be that the nurses who were more dissatisfied with their working conditions or their work ability were more motivated to participate. Nevertheless, the results indicate an association between SOC-strategies and work ability, but caution should be taken when generalising the results to other populations of nurses and other occupational groups. Further research including other occupational groups is encouraged.

Furthermore, *n* was reduced in the analyses mainly due to 'not relevant' responses to single items in the SOC scales that consequently became missing values. This issue has been pointed out as a weakness in the SOC questionnaire used in this study (Meng *et al.* 2021), and future studies are encouraged to try to solve this issue.

It should also be noted that the subscales at the individual level, particularly selection (IS) and compensation (IC) had low Cronbach's alpha values indicating poor internal consistency. It is, however, common in the literature to report low alpha values for the subscales (Baethge *et al.* 2016; Demerouti *et al.* 2014; Müller & Weigl 2017; Müller, Weigl, Heiden, Herbig, *et al.* 2012; Riedel *et al.* 2015; Weber *et al.* 2018; Wiese *et al.* 2002), and it has been argued that the scales cannot be expected to have high internal consistency because SOC captures a broad phenomenon. Nevertheless, the low alpha

values often reported for the SOC subscales at the individual level calls for considerations on whether they are best treated as single items rather than scales.

Lastly, the measurement of the use of SOC at the group and leadership levels were based on employee ratings. Ideally, the individual ratings of the use of SOC in the group should be aggregated at the group level to get a more solid measure of the use of SOC at this level. However, it was not possible to aggregate to group level because we did not have information on which groups, the participants worked in. Future research is encouraged to aggregate individual ratings of the use of SOC in the group to the group level. Furthermore, direct measures of the use of SOC at the leadership level may prove to be useful in future research on the impact of the use of SOC beyond the individual level on a healthy and long working life.

Conclusion

The aim of the study was to explore the strength of associations between employee-rated use of SOC strategies at the individual, group, and leadership levels and self-rated work ability among nurses. So far, research has only explored associations between individual use of SOC strategies and work ability. The findings indicate that the use of SOC at the individual and group levels contribute to the work ability of nurses beyond health, job control, quantitative job demands, and social capital. In addition, the results indicate that the use of SOC at the group level has the strongest association with work ability. The study thus contributes with new insight into factors associated with nurses' work ability. The results indicate that measures to enhance the collective use of SOC strategies at the group level may prove beneficial to maintain the work ability of nurses.

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Conflicts of interest

The authors declare no conflicts of interest.

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