



ORIGINAL ARTICLE

Work-Related Sense of Coherence and Longitudinal Relationships with Work Engagement and Job Satisfaction

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The aim of this longitudinal study was to investigate the relationships between work-related sense of coherence (work-SOC) and the two well-being concepts of job satisfaction and work engagement. The study was conducted among nursing home employees, who answered a survey in two waves with a one-year interval. The results of structural equation modelling analyses showed that work-SOC was related to future work engagement but not job satisfaction, indicating that work-SOC contributes to active rather than passive states of well-being. Hypotheses of neither reversed nor reciprocal relationships were supported. The longitudinal relationship with work engagement suggests that work-SOC is an important factor to consider in workplace health promotion and management of employee health, and further research is therefore recommended to learn more about the nature and development of work-SOC.

Keywords: work-related sense of coherence; work engagement; job satisfaction; subjective well-being; workplace health promotion

Work-related sense of coherence (work-SOC) is “the perceived comprehensibility, manageability and meaningfulness of an individual’s current work situation” (Vogt, Jenny and Bauer, 2013: 2). Rooted in the salutogenic tradition, which has its focus on the origins of health rather than disease and risk factors (Mittelmark and Bauer, 2017), the concept was proposed approximately ten years ago as an indicator for the health-promoting quality of life at work (Bauer and Jenny, 2007). Similar to the global sense of coherence (SOC; Antonovsky, 1979, 1987), work-SOC is conceptualized with three dimensions. Comprehensibility is the cognitive component of the concept, describing the perception of the work situation as structured, consistent and clear (Vogt et al., 2013). Manageability is the instrumental component of the concept, describing the extent to which the individual perceives that adequate resources are available to cope with demands that are posed by the work environment. Meaningfulness is the motivational component reflecting whether the work situation is seen as worthy of commitment and involvement.

Research on work-SOC is still in its early stages. Initial studies have shown that work-SOC is correlated to job resources, affective organizational commitment, work enthusiasm and mental health (Bauer et al., 2015; Vogt et al., 2013; Zweber, 2014). In addition, work-SOC has been found to have a partial indirect effect on the

cross-sectional relationships between job resources and work engagement, and job demands and exhaustion (Vogt et al., 2013). Van der Westhuizen (2018) found that work-SOC, compared to global SOC, was a better predictor for work engagement.

Work-SOC has been suggested as particularly relevant for researchers and practitioners working with occupational health interventions (Vogt et al., 2013). Such interventions have gained increasingly more interest in recent years (Nielsen et al., 2010) and is a topic that continues to be relevant, since working life is characterized by continuous technological, political and globalization-related changes that influence the health of workers (Price, 2015). Good health and well-being are not only valuable for the individual but also of strategic value for organizations with regards to factors such as workability, absenteeism, productivity and job performance (e.g., Merrill et al., 2013; von Thiele Schwarz et al., 2015). At the societal level, ensuring healthy work environments will be a very important issue in the years to come, as retaining workers beyond today’s retirement age will be required to cope with challenges due to population ageing (Doyle et al., 2009).

Work-SOC seems to be a relevant concept pertaining to the above matters. However, the empirical knowledge about the causal mechanisms of work-SOC and its precursors and outcomes is still very limited. The present study focuses on employees in nursing homes, which is particularly relevant, in view of increasing pressure on long-term care services (World Health Organization, 2014) and issues such as high turnover and absence rates in this sector (Hayes et al., 2012; Statistics Norway, 2017). Work-SOC will be investigated in relation to job satisfaction

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and work engagement which reflect different kinds of work-related well-being. The rationale is that determining relationships with these established and widely researched concepts may provide a better understanding of work-SOC of relevance to its construct validity and application in further research and practice. The study will add to the literature by investigating work-SOC as both a precursor and outcome of well-being. The relevance of this will be explained through the job demands-resources (JD-R) model (Bakker and Demerouti, 2017; Demerouti et al., 2001) which is used as a framework to form the study hypotheses.

The Job Demands-Resources Model

Proposed in the JD-R model (Bakker and Demerouti, 2017; Demerouti et al., 2001), employees' well-being (e.g., job satisfaction and work engagement) can change as an outcome of health-impairing or motivational processes instigated by job demands or job resources, respectively. Job resources are physical, psychological, social or organizational aspects of the job that function to achieve work goals, reduce job demands and associated physiological and psychological costs, and/or stimulate personal growth, learning and development (Bakker and Demerouti, 2007). It is also assumed that personal resources, described as "the beliefs people hold regarding how much control they have over their environment" (Bakker and Demerouti, 2017: 27), can act like job resources in producing favourable outcomes. This definition seems similar to that of the manageability dimension of work-SOC, and studies have shown that work-SOC is related to job resources (Bauer et al., 2015; Vogt et al., 2013). However, the initiators of the work-SOC concept (Brauchli et al., 2015; Jenny et al., 2017) characterize work-SOC as neither a resource nor a well-being outcome in the JD-R model. Instead, they suggest expanding the JD-R model by including work-SOC as its own category and being more explicit in describing health and well-being as a result of pathogenic and salutogenic pathways, in line with the salutogenic theory of Antonovsky (1979, 1987).

These pathogenic and salutogenic pathways are described corresponding to the health-impairing and motivational processes mentioned above. It is suggested that the role of work-SOC in the pathogenic pathway is to buffer negative health effects from job demands (Jenny et al., 2017). Regarding the salutogenic pathway, the assumption is that job resources influence work-SOC, which in turn strengthens the global SOC and further leads to positive health effects. A part of such a salutogenic pathway was demonstrated in a study by Feldt, Kinnunen and Mauno (2000) who found that global SOC was related to later occupational well-being.

Work-related subjective well-being

Job satisfaction has traditionally been the most studied form of work-related subjective well-being (Bakker and Oerlemans, 2011; Spector, 1997). It can be described as the extent to which people like their job and is either a global feeling about the job or a constellation of attitudes towards different facets of the job (Spector, 1997). Locke

(1969) defined job satisfaction as a "pleasurable emotional state resulting from the appraisal of one's job as achieving or facilitating the achievement of one's job values" (1969: 316). A review of studies conducted among long-term care workers identified autonomy, empowerment, facility resources and workload as important factors to increase job satisfaction, while factors such as age, gender, education level and salary were less important (Squires et al., 2015). Job satisfaction seems to be a predictor, beyond the effect of occupational commitment, of nurses' turnover intentions (van der Heijden, van Dam, and Hasselhorn, 2009).

Another well-being concept that has gained increasing interest in recent years is work engagement. It has most often been described as "a positive, fulfilling, work-related state of mind that is characterized by vigour, dedication, and absorption" (Schaufeli et al., 2002: 74). Vigorous employees are willing to invest effort in the work and have high levels of energy and mental resilience; dedicated employees feel a sense of significance, pride, enthusiasm, inspiration, and challenge regarding their work; absorbed employees have difficulties with detaching from their work, with which they are fully engrossed and focused, and experience time as passing quickly (Schaufeli et al., 2002). Work engagement seems to be a predictor of nurses' performance and quality of care, and research has pointed to a broad range of individual and organizational antecedents such as a positive work climate and social support (García-Sierra, Fernández-Castro, and Martínez-Zaragoza, 2016). Exploring work engagement across eight different occupational groups, Innstrand (2016) found that the precursors differed across occupations. For the nurses, having a performance-based self-esteem was negatively related to vigour, whereas autonomy was positively related to dedication two years later. Although nurses did not differ from the reference group (church ministers) in the level of vigour, they felt significantly less dedicated.

Further from the specific definitions, the circumplex model of affect (Russell, 1980) can be used to highlight the differences between these two well-being concepts. This model assumes that all affective states can be mapped onto the dimensions of valence (displeasure—pleasure) and alertness (low activation—high activation). According to this, job satisfaction and work engagement both reflect pleasurable or positive states but differ in their degree of activation (Bakker and Oerlemans, 2011). While job satisfaction can be seen as a rather passive state, viewing the job as acceptable, work engagement additionally involves motivation, enthusiasm and energy, and thus a high level of activation. Warr and Inceoglu (2012) argued that the difference between the primary roles of these two concepts was that the motivation of engaged people means they have wants that are unsatisfied, while job satisfaction reflects that needs or wants have been or are expected to be fulfilled. Judge et al. (2017) argue that the difference between the concepts is that job satisfaction is an attitudinal concept, meaning that it is an evaluative judgement of the job, while work engagement is a motivational concept.

Gain spirals

The notion of gain spirals has become, similar to the theories of conservation of resources (Hobfoll, 1989) and broaden-and-build (Fredrickson, 1998), an essential assumption in the JD-R model. As mentioned, resources lead to motivation and positive well-being. Gain spirals become evident when this further leads to proactive job crafting behaviour, which will then lead to even higher levels of resources and subsequent motivation and well-being (Bakker and Demerouti, 2017). Previous longitudinal studies have yielded support for such gain spirals in finding reciprocal relationships between, for example, job resources and global SOC (Vogt et al., 2016), as well as between job and personal resources and work engagement (Xanthopoulou et al., 2009a).

On this basis, we argue that reciprocal relationships are relevant to address between work-SOC and well-being as well. Firstly, it can be assumed that a positive state of mind may affect employees' perceptions of the working environment (Bakker and Demerouti, 2014). Job satisfaction and work engagement may thus affect the degree to which employees perceive their work environment as comprehensible, manageable and meaningful. Secondly, well-being may affect employees' behaviour at work pertaining to the activation and creation of new job resources, and achievement of work goals (Bakker and Demerouti, 2014). The latter seems particularly relevant regarding work engagement, which includes activation and motivation. However, a study by Wong, Hui, and Law (1998) found that job satisfaction was related to the perception of work characteristics two years later, meaning that reciprocal relationships are relevant to investigate also in that case.

Aim and Hypotheses

As previously stated, the goal of this study is to contribute to a better understanding of work-SOC. More specifically, the aim is to investigate longitudinal relationships between work-SOC and the two concepts of job satisfaction and work engagement. Based on the theories and empirical evidence presented, we would like to test different hypotheses on the relationships between the study variables. First, we expect that work-SOC is positively related to future job satisfaction (*Hypothesis 1a*) and work engagement (*Hypothesis 1b*). Second, we hypothesize reversed relationships between these variables, in that job satisfaction (*Hypothesis 2a*) and work engagement (*Hypothesis 2b*) are positively related to future work-SOC. Third, we combine the two latter hypotheses and assume that work-SOC is reciprocally related to job satisfaction (*Hypothesis 3a*) and work engagement (*Hypothesis 3b*).

Method

Participants and Procedure

The current study used data from a larger research project about work characteristics, occupational well-being and an ongoing certification scheme in nursing homes in Norway. Prior to the data collection, The Regional Committee for Medical and Health Research Ethics declared that approval for the project was not required

according to the Norwegian Health Research Act. Further, a notification of the project was sent to The Norwegian Centre for Research Data, Data Protection Services.

Data were collected in two waves among employees in 43 nursing homes in two Norwegian municipalities. A one-year interval was chosen for practical reasons. Data were collected in the same period both years to control for possible seasonal variations regarding, for example, job demands in the nursing homes. The same procedure was followed at both time points. Invitations to participate in an online survey were distributed to the employees by e-mail via contact persons in each nursing home. Information about the research project was provided attached to the invitations. Participation was voluntary, and consent was given by completing the survey. Employees were invited to participate in the follow-up (time 2; T2) survey, regardless of whether they participated at baseline (time 1; T1), for purposes other than the current study. At T1, 558 employees answered the survey, while 515 answered the survey at T2. This study's sample consisted of 166 employees who answered the survey at both waves. The respondents created their own personal codes that were used to link the T1 and T2 responses.

The estimated response rates were 20% at T1 and 16% at T2, based on the number of sent invitations, 2,835 and 3,221 respectively. However, these percentages are probably higher in reality because some employees likely received multiple invitations due to overlapping employment in two or more nursing homes. In addition, contact persons reported that mailing lists were not up-to-date and that the nursing homes had different practices regarding e-mail communication. We therefore cannot be certain that all invitation e-mails were actually read.

Among this study's sample ($N = 166$), the majority were female (92%), and ages at T1 ranged from 20 to 66 years ($M = 44.9$, $SD = 12.1$). This is comparable to population statistics in the health and social services in Norway, which shows a female majority of 79% (Statistics Norway, 2019). Professional groups were distributed between nurses (45%), assistant nurses (38%), other health- and social-related personnel (13%) and staff and support functions (4%). At T1, the employees had a mean of 30.9 ($SD = 8.2$) contracted work hours per week, tenure of 9.0 years ($SD = 7.3$) at their current work place, and 19% had leadership responsibilities.

Measures

Work-SOC was measured using a seven-point scale with bipolar adjective pairs (Bauer et al., 2015; Vogt et al., 2013). The overall question was, "How do you personally find your current job and work situation in general?" The original version of the scale comprises nine items. In the current study, the scale was treated according to a validation of the Norwegian translation (Grødal et al., 2018) with a total of eight items representing the dimensions of comprehensibility (three items, e.g., "Structured—Unstructured"), manageability (two items, e.g., "Easy to influence—Impossible to influence"), and meaningfulness (three items, e.g., "Meaningless—Meaningful"). Scores were calculated as mean scores of the respective items.

Work engagement was measured using the nine-item version of the Utrecht Work Engagement Scale (UWES-9; Schaufeli, Bakker, and Salanova, 2006). This shortened version was recommended over the original 17-item version based on a Norwegian validation (Nerstad, Richardsen, and Martinussen, 2010). The scale consists of three subscales representing the dimensions of vigour (three items, e.g., “At my work, I feel bursting with energy”), dedication (three items, e.g., “I am proud of the work that I do”), and absorption (three items, e.g., “I am immersed in my work”). Items were rated on a seven-point scale from (1) “never” to (7) “daily”.

Job satisfaction was measured using a four-item scale from the second version of the Copenhagen Psychosocial Questionnaire (COPSOQ II; Pejtersen, et al., 2010). Regarding their work in general, participants were asked to indicate how pleased they were with their work prospects, the physical working conditions, the way their abilities were used, and their job as a whole, everything taken into consideration. Responses were given on a five-point scale from (1) “very dissatisfied” to (5) “very satisfied”.

Statistical Analysis

The software Stata version 14.2 (StataCorp, 2015) was used to analyse the data by means of structural equation modelling (SEM) and the maximum likelihood estimation method. SEM is a method that uses latent variables and accounts for measurement errors (Kline, 2011). Further, it provides opportunities for testing several dependent variables in one model and comparing the goodness of fit of different models, which was relevant in the current study. The amount of missing observations on the included variables ranged from 0 to 7 (4.22%). Missing values were deleted listwise in all analyses.

The measurement model consisted of six latent variables. T1 and T2 Work-SOC and work engagement were

indicated by their respective subscale scores, while T1 and T2 job satisfaction were indicated by their respective four item scores. The practice of parcelling, as by using subscale scores, has been disputed but was considered reasonable in the current study because of the benefits of reducing model complexity, given the small sample size, and since the dimensionality of the constructs were known from earlier studies (Little et al., 2002). Such parcelling has also been used in previous studies on work engagement and global SOC (e.g., Hakanen, Bakker, and Schaufeli, 2006; Vogt et al., 2016). The measurement errors of the same indicators measured at T1 and T2 were allowed to covary. The goodness of fit of the measurement model was tested by confirmatory factor analysis (CFA).

As a prerequisite for the analyses of the hypotheses, discriminant validity, meaning that the study concepts are distinct, was assessed by the criterion that the average variance extracted (AVE) of each latent variable should be greater than its squared correlation with any of the other latent variables in the model (Fornell and Larcker, 1981).

The study hypotheses were tested by fitting four competing models to the data with an approach that has been used and described in several previous longitudinal studies on reciprocal relationships between variables such as work characteristics, SOC and well-being (e.g., de Jonge et al., 2001; Feldt et al., 2004; Xanthopoulou et al., 2009a). The study models are illustrated in **Figure 1**. The first model ($M_{stability}$) was a stability model in which each latent variable at T1 was assumed to predict the same latent variable at T2. The second model ($M_{causality}$) included the stability paths and paths from work-SOC at T1 to job satisfaction (Hypothesis 1a) and work engagement (Hypothesis 1b) at T2, suggesting causal relationships. The third model ($M_{reversed}$) included the stability paths and paths from job satisfaction (Hypothesis 2a) and

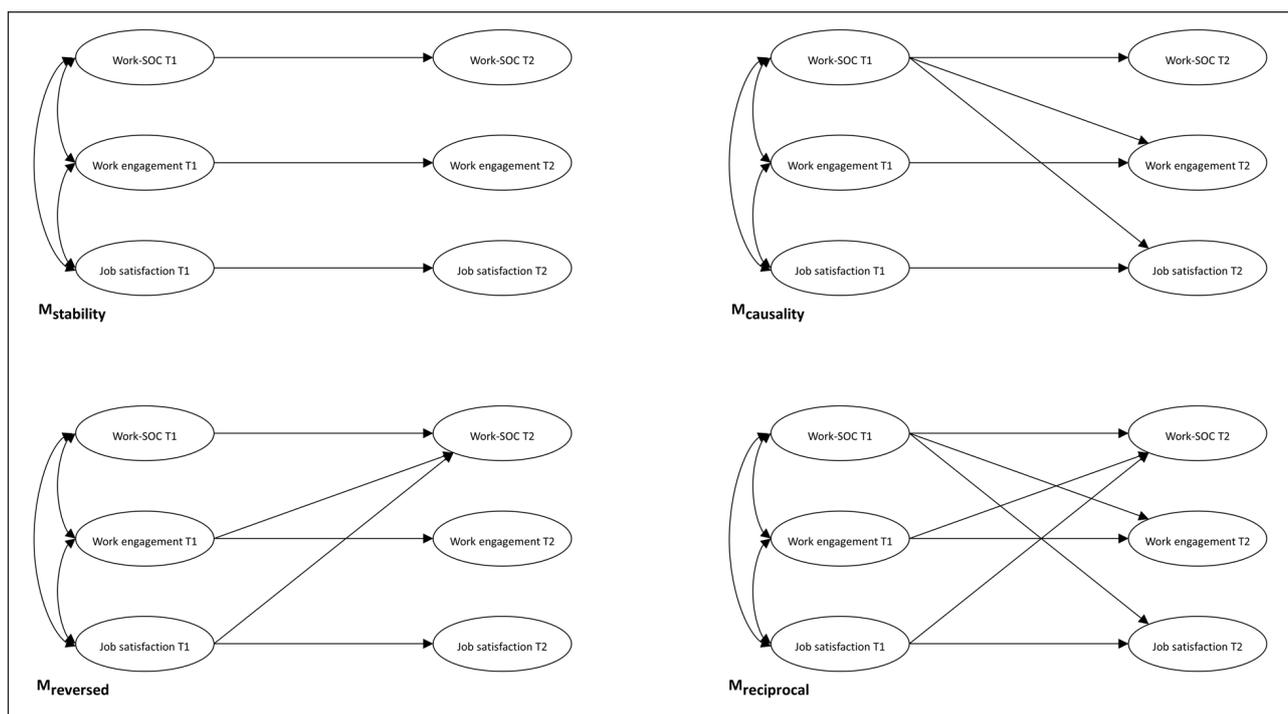


Figure 1: The competing study models.

work engagement (Hypothesis 2b) at T1 to work-SOC at T2, suggesting reversed causal relationships. The fourth model ($M_{reciprocal}$) included all of the previously described paths, suggesting that the study variables are reciprocally related over time (Hypotheses 3a and 3b). The inclusion of stability paths in all models were done to control for the baseline scores of each latent variable.

An overall evaluation of goodness of fit was evaluated based on chi-square (χ^2), standardized root mean squared residual (SRMR), root mean squared error of approximation (RMSEA), comparative fit index (CFI), and Tucker-Lewis index (TLI) tests. Conventional criteria for good model fit to the data are: close to 0.95 for CFI and TLI, 0.08 for SRMR, and 0.06 for RMSEA (Hu & Bentler, 1999). However, Hu and Bentler (1999) noted that these criteria may be overly strict under conditions of small samples and non-robust data (e.g., multivariate non-normality), and the values were therefore not treated as exact cut-offs. Model comparisons were based on χ^2 difference tests. Further, parameter estimates were inspected to determine the relationships between the variables.

Results

To check for potential attrition bias, the final study sample was compared to respondents who only answered the survey at T1. The results (Table 1) showed that dropouts scored significantly lower on work-SOC and work engagement. No difference was found on job satisfaction. Dropouts were significantly younger and had significantly fewer contracted work hours per week. However, the results were probably not influenced severely by these

differences since effect sizes (Cohen's *d*) were found to be small (Cohen, 1988).

Table 2 shows the means, standard deviations, internal consistencies (Cronbach's α) and correlations between the study variables. The internal consistencies were satisfactory at both T1 and T2 ($\alpha \geq 0.71$). All correlations were positive and significant ($p < 0.05$). T1 variables and corresponding T2 variables were moderately or strongly correlated ($r = 0.42-0.65, p < 0.001$), indicating that the participants had a relatively stable perception of the concepts under study. This finding was also supported by non-changing mean levels of work-SOC ($t(155) = -0.74, p = 0.46$), work engagement ($t(165) = -0.05, p = 0.96$), and job satisfaction ($t(164) = -0.55, p = 0.58$) from T1 to T2.

Confirmatory factor analysis indicated that the measurement model fitted the data well ($\chi^2(145) = 221.333, p < 0.001$; RMSEA = 0.059; SRMR = 0.076; CFI = 0.967; TLI = 0.957). Table 3 shows that the AVE values for each of the latent variables in the model are greater than their squared correlations with any of the other latent variables, supporting discriminant validity between work-SOC, job satisfaction and work engagement.

Table 4 displays the overall goodness of fit statistics of the alternative study models. Model comparisons showed that $M_{causality}$ fitted the data relatively well ($\chi^2(149) = 236.836, p < 0.001$; RMSEA = 0.063; SRMR = 0.083; CFI = 0.962; TLI = 0.952) and significantly better than $M_{stability}$ ($\Delta\chi^2(2) = 6.233, p < 0.05$). Compared to $M_{stability}$, neither $M_{reversed}$ ($\Delta\chi^2(2) = 3.416, p = 0.181$) nor $M_{reciprocal}$ ($\Delta\chi^2(4) = 8.491, p = 0.08$) fitted the data better. Hence, $M_{causality}$ gave the best representation of the study data.

Table 1: Analyses of attrition bias.

Variable	Study sample		Dropouts		t-value	Cohen's d
	M	SD	M	SD		
Work-SOC	5.34	1.13	4.94	1.14	-3.70***	-0.35
Job satisfaction	3.74	0.83	3.62	0.81	-1.62	
Work engagement	5.66	1.23	5.38	1.32	-2.31*	-0.21
Age	44.94	12.05	40.84	13.41	-3.46***	-0.32
Contracted work hours	30.87	8.18	28.72	10.15	-2.55*	-0.22

Note: Variables measured at T1.

* $p < 0.05$. *** $p < 0.001$.

Table 2: Means, standard deviations, internal consistencies and correlations between the study variables.

	M	SD	1	2	3	4	5	6
Work-SOC T1	5.34	1.13	(0.88)					
Work engagement T1	5.66	1.23	0.54***	(0.93)				
Job Satisfaction T1	3.74	0.83	0.68***	0.68***	(0.87)			
Work-SOC T2	5.41	1.10	0.59***	0.35***	0.52***	(0.87)		
Work engagement T2	5.66	1.25	0.47***	0.64***	0.61***	0.52***	(0.95)	
Job Satisfaction T2	3.78	0.81	0.44***	0.44***	0.65***	0.58***	0.66***	(0.87)

Note: Cronbach's alphas (α) in diagonals.

*** $p < 0.001$.

Figure 2 shows the standardized coefficients of $M_{causality}$. The model explained 30% of the variance in T2 work-SOC ($R^2 = 0.30$), 50% of T2 work engagement ($R^2 = 0.50$), and 46% of T2 job satisfaction ($R^2 = 0.46$). The stability paths of work-SOC ($\beta = 0.54, p < 0.001$), work engagement ($\beta = 0.57, p < 0.001$) and job satisfaction ($\beta = 0.53, p < 0.001$) were significant, suggesting that the T2 levels of these variables depend on T1 levels. The parameter estimates show that hypothesis 1a, suggesting that work-SOC is related to future job satisfaction, was not supported ($\beta = 0.18, p = 0.11$). Hypothesis 1b, suggesting that work-SOC is related to future work engagement, was supported ($\beta = 0.20, p < 0.05$). Hypotheses 2a and 2b suggesting reversed relationships, and hypotheses 3a and 3b suggesting reciprocal relationships, were rejected since $M_{reversed}$ and $M_{reciprocal}$ were poorer fitting models and also failed to prove significant paths from T2 work engagement and T2 job satisfaction to T1 work-SOC.

Discussion

The aim of this longitudinal study was to investigate relationships between work-SOC and the two concepts of job satisfaction and work engagement. The analyses supported that work-SOC was related to future work engagement (Hypothesis 1a) but not to job satisfaction (Hypothesis 1b). The results did not support reversed (Hypotheses 2a and 2b) or reciprocal relationships (Hypotheses 3a and 3b).

Table 3: Discriminant validity of latent variables in measurement model.

	1	2	3	4	5	6
Work-SOC T1	0.60					
Work-SOC T2	0.27	0.61				
Work engagement T1	0.34	0.13	0.78			
Work engagement T2	0.25	0.25	0.48	0.81		
Job Satisfaction T1	0.56	0.28	0.58	0.51	0.63	
Job Satisfaction T2	0.30	0.38	0.28	0.59	0.53	0.63

Note: Off-diagonals: squared correlations. Diagonals/bold: AVE (average variance extracted).

The significant relationship between work-SOC and future work engagement is interesting when discussing the nature of work-SOC. Seen together with the result of a non-significant relationship between work-SOC and job satisfaction, an interpretation could be that the perception of a work situation as comprehensible, manageable and meaningful leads to a state of active, rather than passive, well-being, as distinguished by the circumplex model (Russell, 1980). Work-SOC includes the motivational component of meaningfulness, which arguably is a prerequisite of activation. Hence, it could be that the meaningfulness dimension makes work-SOC a driver towards motivated and energized states such as work engagement.

The present study's lack of support for reciprocal relationships was surprising since previous studies have supported gain spirals in which work engagement has been reciprocally related to job resources and personal resources (Schaufeli, Bakker, and van Rhenen, 2009; Xanthopoulou et al., 2009a). Even if the results showed that the stability of work-SOC was similar to job satisfaction and work engagement, it could be that the span of one year is too short to detect changes in work-SOC based on occupational well-being. Work-SOC is dependent upon personal characteristics and the employee's experiences throughout his or her entire work life, and it is reasonable to think that the perception of resources is relatively more fluctuating than work-SOC. It is also possible that signs of potential reversed effects may be delayed because of third variables, such as job resources, that may explain causal mechanisms in the relationship between the variables.

Work engagement, which includes drive, motivation and energy, has previously been shown to be related to employee performance and productivity (Bakker, Demerouti, and Verbeke, 2004; Hakanen and Koivumäki, 2014; Xanthopoulou et al., 2009b). In addition to keeping employees healthy and thriving, their performance and productivity are necessarily important factors for organizations to succeed and even to survive. Since the results indicate that work-SOC is a precursor of work engagement, it will be beneficial for organizations to promote a comprehensible, manageable and meaningful work situation for their employees. According to JD-R theory, this can be done through enhancing job resources (Bakker and Demerouti, 2017). In addition, they could facilitate job crafting so that individuals proactively

Table 4: Goodness of fit statistics for the alternative study models.

	χ^2 (df)	χ^2 /df	RMSEA	SRMR	CFI	TLI
$M_{stability}$	243.069(151)***	1.610	0.064	0.096	0.960	0.950
$M_{causality}$ (WS → WE/JS)	236.836(149)***	1.590	0.063	0.083	0.962	0.952
$M_{reversed}$ (WE/JS → WS)	239.653(149)***	1.608	0.064	0.089	0.961	0.950
$M_{reciprocal}$ (WS ↔ WE/JS)	234.578(147)***	1.596	0.063	0.080	0.962	0.951

Note: χ^2 , chi squared; df, degrees of freedom; RMSEA, root mean squared error of approximation; SRMR, standard root mean squared residual; CFI, comparative fit index; TLI, Tucker-Lewis index; WS, work-SOC; WE, work engagement; JS, job satisfaction.

*** $p < 0.001$.

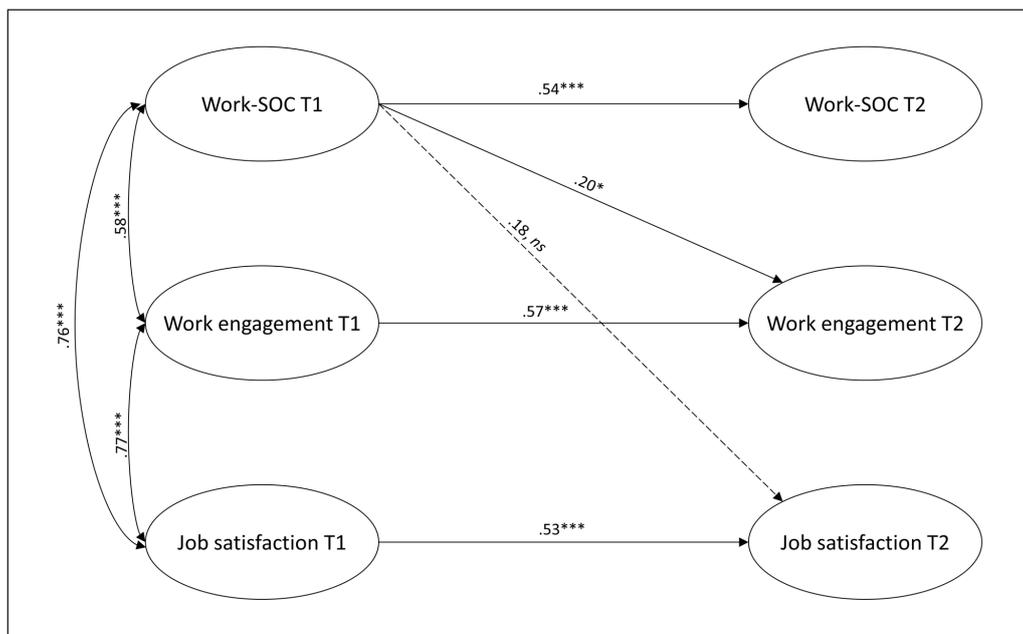


Figure 2: Standardized path coefficients of $M_{causality}$. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. ns = not significant.

can shape their work tasks and relationships in a way that affects their work identity and how they perceive the meaning of work (Wrzesniewski and Dutton, 2001). However, the mechanisms leading to work-SOC should be studied further empirically.

Based on the results, it will be interesting for future studies to explore the mechanisms of the development of work-SOC, in terms of how it changes over time and which variables can make it change. Earlier studies have shown that work-SOC is related to job resources and job demands (Bauer et al., 2015; Vogt et al., 2013), but causal relationships have not been investigated. Since the results indicate that work-SOC leads to active, but not passive, well-being it would be interesting to investigate if work-SOC is stronger related to certain types of job resources than to others.

Regarding the development of work-SOC, it could also be interesting to illuminate whether different kinds of job demands affect work-SOC differently. The assumption that job demands are negatively related to work-SOC has been supported empirically (Bauer et al., 2015; Vogt et al., 2013). However, future studies could investigate whether job demands appraised as challenging rather than hindering (e.g., Webster, Beehr, and Love, 2011) have a positive impact on work-SOC, as long as adequate resources are in place. In addition, the salutogenic theory assumes that SOC is influential on the degree to which an individual perceives a situation as stressful (Antonovsky, 1979, 1987). Applied to the work-setting, this would mean that work-SOC influences the way the individual perceives job demands, and that that so-called loss- or gain-spirals could be relevant also here. The line of reasoning is that an individual who has a low work-SOC score, would be more inclined to perceive job demands as hindering, which could further affect work-SOC negatively, and so on. Last, recent studies within healthcare have shown that interactions between different job demands are relevant

to well-being outcomes (Jimmieson, Tucker, and Walsh, 2017; van Woerkom, Bakker, and Nishii, 2016), and it therefore seems important to consider the totality of the individual's work situation when studying these matters.

Strengths and limitations

Important strengths of this study were the use of longitudinal rather than cross-sectional data and the application of SEM to investigate directions of relationships. In addition, we applied previously validated instruments to measure the concepts under study. The measure for job satisfaction was carefully considered to avoid discriminant validity problems in relation to work engagement. Warr and Inceoglu (2012) argued that many measures of job satisfaction reflect aspects beyond the true meaning of the concept, such as energy and activation. In this study, it was important to avoid such measures, and the results supported that we succeeded with this intention.

There were also limitations to this study that must be noted. First, the sample size was small, which is a disadvantage in SEM (Kline, 2011). Particularly for complex models (i.e., many estimated parameters), small samples may lead to problems such as inaccurately estimated standard errors. We therefore strove to keep the model as simple as possible by not including more variables to the analyses and by using dimension scores instead of items as indicators of work-SOC and work engagement. However, there is still a chance that type-2 errors might have occurred in this study, and we recommend future studies to investigate the hypotheses with larger samples.

Second, the estimated response rates were very low, which casts doubt over the generalizability of the results. As high levels of sick leave and turnover are common problems in this sector (Hayes et al., 2012; Statistics Norway, 2017), and low response rates seem to be a common challenge in studies among health personnel

(e.g., Fida, Laschinger, and Leiter, 2016; Mark and Smith, 2012; van der Heijden et al., 2008), we were aware that obtaining a sufficiently large sample for longitudinal analyses could be difficult. To ensure that we were actually able to execute the study, we therefore made the choice to invite a great number of employees to thereby recruit as many as possible, potentially at the expense of obtaining a high response rate. We also included all professional groups since the nursing home as a workplace was the focus, and not the situation for certain professions. The analyses showed small effects of attrition bias that may partly be explained by a healthy worker effect since dropouts scored lower on work engagement and work-SOC. In addition, dropouts were younger and had fewer contracted work hours, which indicates that turnover is a likely explanation (Hayes et al., 2012). Together this might have affected the generalizability of the results to the whole spectrum of employees in nursing homes.

Third, there is a chance that common variance between the constructs could be attributed to the fact that all measures were based on self-reports (Podsakoff et al., 2003). However, this effect might have been reduced by the time lags between measurements (Doty and Glick, 1998). Last, since the study was conducted among a relatively homogenous sample of nursing home employees, we cannot conclude that the results are generalizable to other sectors and professions.

Conclusion

This study adds to the knowledge on work-SOC by showing a significant relationship to future work engagement but not job satisfaction, which may indicate that work-SOC contributes to active rather than passive states of well-being. Hypotheses of reversed and reciprocal relationships were not supported in this study. Overall, the findings suggest that work-SOC is important to consider for practitioners working with promotion and management of workers' health and well-being. The study sheds light on the importance of healthy work environments in nursing homes, which will be essential in the coming years with population ageing. However, work-SOC is still a relatively unexplored concept, and future research should aim to investigate its precursors (e.g., job crafting, job and personal resources) and outcomes (e.g., health, well-being and organizational outcomes).

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Competing Interests

The authors have no competing interests to declare.

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