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*A cross-sectional study*

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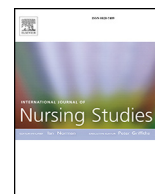
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## Positive association between social capital and the quality of health care service: A cross-sectional study<sup>☆</sup>



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### ABSTRACT

**Background:** Social capital is an acknowledged theoretical concept in work environment research focusing on collective resources that arise from social networks between employees in the workplace. Social capital is divided into bonding (in the work unit), bridging (between work units), and linking social capital (between the work units and management). However, only a few studies have investigated the relationship between social capital and the quality of health care, which is the key outcome of hospital services.

**Objective:** We investigated the associations between bonding, bridging and two types of linking social capital with the self-reported quality of health care services among Danish hospital employees. Next, we directly compared how social capital, workload and work pace each affected the quality of health care.

**Design:** A cross-sectional study at Regional Hospital West Jutland, Denmark.

**Data:** Questionnaire data were collected from 1589 Danish hospital employees. We used validated scales for social capital, workload, and work pace and self-developed scales for clinical quality, quality of patient involvement, and overall professional quality.

**Methods:** Binary logistic regression analyses were conducted.

**Results:** The analyses showed significant, positive associations of bonding and bridging social capital with all types of quality and negative associations between workload and all types of quality. The work pace was negatively associated with clinical quality. When covariates were included in the model, the associations remained statistically significant and showed no decrease in odds ratios.

The marginal effects showed that when bonding and bridging social capital were increased by a single scale point, the predicted probability for a high clinical quality increased by an average of 0.5 percentage points. This increase corresponds to a change in the predicted probability of self-reported high clinical quality from 10% for the lowest reported bridging social capital to 54% for the highest reported bridging social capital. For workload and work pace, the effects were  $-0.2$  and  $-0.3$  percentage points, respectively.

**Discussion & conclusions:** This study adds to the literature on positive work environment factors by focusing on social capital and the importance of well-functioning relationships within and especially between hospital units for high-quality health care. Hence, bridging and bonding social capital should be included in theoretical frameworks, as well as in hospital strategies and work environment guidelines to potentially improve the quality of health care services. However, further studies are needed to develop and test the effects of specific social capital interventions on the quality of health care services.

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<sup>☆</sup> Louise Møller Pedersen and Andreas Lindegaard Jakobsen share the first authorship, but Louise is, as the main academic developer of the project and main writer of the article, to be mentioned first.

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### What is already known

- Previous international studies have documented how high work pressure on hospital staff negatively affects the work environment and the quality of health care services.
- The psychosocial work environment exerts significant effects on the physical and mental health of employees, as well as their job performance.

- Social capital is a newly revised theoretical concept for measuring collective resources in the work environment that may be linked to company outcome measures, such as employee wellbeing, engagement, innovation, and quality of work.

### What this paper adds

- The results from the first study of the relationships of the new conception of the theory of social capital documents positive associations between different subtypes of social capital and staff self-reported quality of health care services.
- Bonding and bridging social capital were associated with higher quality health care services, indicating the importance of well-functioning relationships, including a mutual understanding of work tasks and sufficient communication between hospital units and departments.
- The positive effects of bonding and bridging social capital on clinical quality are greater than the negative effects of a high workload and fast work pace.

## 1. Introduction

The psychosocial work environment is an overall concept encompassing a number of different positive and negative psychological and social factors and processes that employees experience in relation to their work and affect employee behavior, wellbeing at work and work-life sustainability (Clausen et al., 2019a). Reviews and meta-analyses have reported the significant effect of the psychosocial work environment on the physical and mental health of employees. Psychosocial work stressors have been documented to increase the risk of musculoskeletal disorders (Hauke et al., 2011), common mental disorders (Stansfeld and Candy, 2006) and depressive symptoms (Theorell et al., 2015). These findings have been supported by studies conducted in a hospital context focusing on healthcare workers' mental-emotional health (Koinis et al., 2015; Kowalski et al., 2010) and sickness-related absences (Török et al., 2018). In addition to health effects, recent international reviews have shown a link between the general psychosocial work environment/working conditions and the quality of health care services of hospitals (Angerer and Weigl, 2015; Teoh et al., 2019). In these reviews, most studies provide support for a relationship between doctors/physicians' physical work conditions and different aspects of quality of care. Thus, the psychosocial work environment in hospitals might result in major social and health consequences for employees, as well as for patients, and ultimately have major socioeconomic consequences. However, more research within this area is needed.

Public healthcare in Denmark and in most other Western countries has experienced high demands for cost-effectiveness, a larger proportion of old and/or chronic patients needing intensive care, the implementation of new technology and higher costs for medicine for many years (Kjellberg and Kollerup Iversen, 2018; Stewart et al., 2020). Additionally, new treatment methods and new perspectives of health care make prioritizing essential (Pedersen, 2019). Based on complex economic analyses, Professor Pedersen (2019) concluded that the public Danish health care system is underfunded by approximately 1% per year (the total cost of the public Danish hospitals in 2018 was 14.9 billion Euros). Based on these analyses, the gap between the funding and the cost is estimated to be widening. Due to increased life expectancy and the factors mentioned above, the pressure for increased effectiveness is expected to continue in the coming decades.

Cross-sectional studies conducted by the National Research Center for the Work Environment (NFA) showed that Danish doctors and nurses are exposed to a challenging psychosocial work environment, including high work pressure, compared to employees in other sectors (Det Nationale Forskningscenter for Arbejdsmiljø, 2019). Similar

findings have been reported in international, cross-sectional studies, indicating a relationship between the psychological work environment and quality of health care services. This relationship was highlighted in a recent systematic review finding that better self-perceived working conditions, such as a lower workload and higher autonomy, appear to be associated with better self-reported and behaviorally based measures of clinical excellence and patient safety (Teoh et al., 2019). However, the authors of this review concluded that the possibility of drawing valid conclusions was limited due to the small number of studies based on an acknowledged theoretical model of working conditions at hospitals and the quality of health care services (Teoh et al., 2019). Hence, more theory-based studies on the relationship between working conditions and the quality of health care are necessary to shift our understanding from a descriptive level to a more in-depth explanation of the existence of this relationship. Improvements in the measurements and statistical methods in many of the previously mentioned studies are likewise needed, such as moving beyond a bi-variable relationship between perceived working conditions and quality of care (Teoh et al., 2019). Hence, novel, theory-based research and comprehensive multiple statistical analyses are needed to explore these relations further. Additionally, guidelines for the work environment in health care systems must be developed.

Most studies within the field of occupational health and the work environment have traditionally focused on identifying risk factors in the psychosocial work environment. However, recent research has tended to supplement the traditional focus on risk factors with a focus on positive (psychosocial) work environment factors. This shift is important since positive psychosocial factors may have unique effects on various outcomes that are not explained solely by negative factors (Munir et al., 2011).

### 1.1. Theory of social capital

The theory of social capital in the workplace has been acknowledged, especially in Scandinavia, and it focuses on the positive factors in the psychosocial work environment. Social capital is defined as “the existing and potential resources in the social relations in the networks between employees on a workplace (a work team, an organization or a society), which enables the social unit to conduct collective actions that influence the work result positively or negatively” (Borg and Friis Andersen, 2017, p. 19, inspired by Coleman, 1988 and Putnam, 1996). The focus is on *collective resources* that manifest themselves in social networks between employees, in which they provide opportunities for collaboration and social support (Kawachi and Berkman, 2001). Hence, this focus is different than Karasek's model of employees' perception of demanding and controlling factors at work (Karasek, 1991). Based on a comprehensive review, Borg and Andersen concluded that social capital is generally a positive factor in the psychological work environment that may be linked to company outcome measures, such as employee wellbeing, engagement, innovation and quality of health care. However, Borg and Andersen also concluded that the possibilities for drawing conclusions are limited due to the use of different definitions of social capital and different measurement methods in the included studies (Borg and Friis Andersen, 2017). Additionally, Borg and Friis Andersen also emphasized that social capital can be used to maintain the power of the unit and to exclude other social units that potentially do not contribute to solving the key task of the organization. Hence, developing a shared vision of the organization is a key element in the social capital of the organization.

Recently, Borg and Friis Andersen redeveloped the concept of social capital and expanded the concept with the identification of three subtypes of social capital: bonding (in the unit), bridging (between units), and linking social capital (between the unit and the overall hospital management) (Fig. 1). Bonding social capital is defined as “the existing and potential resources found in close networks like workgroups or work teams consisting of two or more members. These networks are

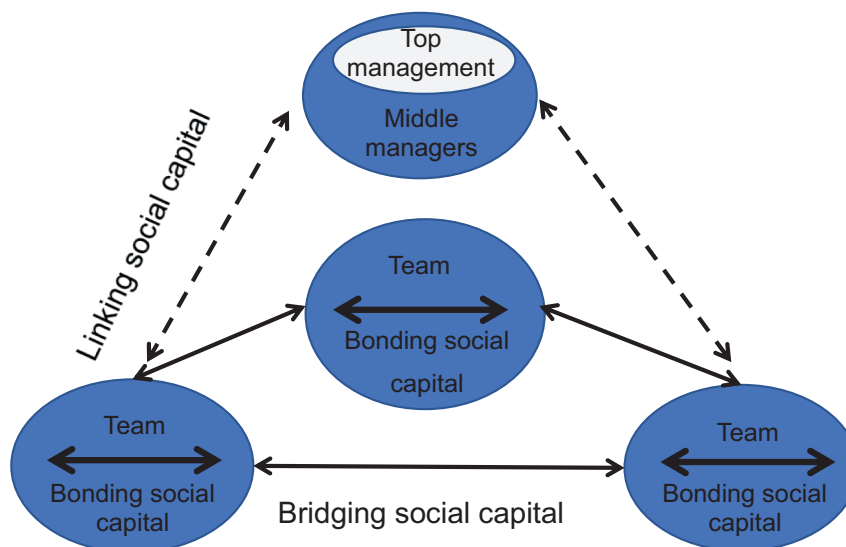


Fig. 1. Social capital and its three subdimensions (translated into English from the study by Borg and Friis Andersen (2017, p. 23).

characterized by direct and frequent meetings and interactions between the members”.

Bridging social capital is defined as “the existing and potential resources in less tied networks between social units, which are characterized by less direct and less frequent meetings and interaction between the members and where the interaction often is undertaken by representatives or so-called network builders”.

Linking social capital is “the existing and potential resources included in the hierarchal social relations between employees and the managers at the different hierarchal levels in organizations and social units” (Borg and Friis Andersen, 2017 p. 22).

Hence, the focus has expanded from the organization as a single unit (here, the hospital) to the organization as a matrix consisting of multiple units that must cooperate to complete the key tasks of the organization (Meng et al., 2018). Putnam described how social capital enables participants to act together more effectively and pursue shared objectives (Putnam, 1996). For example, the network improves team results through better information sharing within the network (bonding social capital), between the network and the managers (linking social capital) or between networks (bridging social capital). Additionally, bonding and bridging social capital may be essential to creating innovation and change. Although close relations (bonding social capital) are important for developing new ideas and implementing them, a looser network (bridging social capital) might be important for obtaining inspiration for new ideas, actions, and input for critical events. In large organizations, such as hospitals, multiple units are often involved in completing the key tasks and thereby influence the overall quality of the produced services. Hence, these redevelopments of social capital theory are relevant for studies within a hospital context.

To our knowledge, no studies have investigated the relationship between the new concept of the theory of social capital and the quality of health care services. Only a few studies have used the new concept of social capital, and they all have focused on the dairy industry (Meng et al., 2019; Clausen et al., 2019b; Meng et al., 2018). One main recommendation from these studies is the importance of distinguishing among the three subtypes of social capital in theory and practice.

The main objective of this study is to investigate the associations of bonding, bridging, and two types of linking social capital with the self-reported quality of health care services among Danish hospital employees. Several international studies have documented that nurses' ratings of various types of quality of health care services are valid measures of quality and are concordant with objective quality data (Cina-Tschumi et al., 2009; Gerolamo, 2008; Klaassen et al., 2010). Our second aim is to directly

compare the effects of different types of social capital with the effects of workload and work pace on the quality of health care services. Quantitative job demands, such as workload and work pace, are well-known risk factors for decreased quality of health care services (Bowling et al., 2015). However, according to the existing evidence, researchers have not clearly determined whether workload, work pace and social capital exert equally strong effects on the quality of health care services. Thus, the research questions of the present study are as follows:

“What are the associations between different types of social capital and the quality of health care services at a Danish hospital? Furthermore, what is the effect of social capital compared to that of the well-known risk factors such as high quantitative job demands?”

The study is structured around the following three hypotheses:

**Hypothesis 1.** Positive associations exist between all subtypes of social capital and employees' self-reported quality of health care services.

**Hypothesis 2.** The effect of social capital varies among the types of quality of health care services.

**Hypothesis 3.** Social capital and quantitative job demands are equally important for the self-reported quality of health care services.

## 2. Methods

### 2.1. Design and population

The study population consisted of all employees working at the Regional Hospital West Jutland, Denmark. The Regional Hospital West Jutland consists of two regional hospitals and three smaller health clinics. The following groups of employees were excluded from the study population due to their weaker associations with the organization: 1) practice reserve doctors; 2) doctors being educated; 3) hospital practice consultants; 4) students, including social and health assistant students, nutritional assistant students, doctor secretary students and other student groups; 5) employees undergoing job training; 6) employees on maternity leave; and 7) employees with fewer than 10 working hours per week. This process resulted in a study population of 3337 full- and part-time employees. In December 2018, these employees received a web-based questionnaire through their work e-mail. All of the respondents were informed that participation was voluntary. Furthermore, the hospital management provided approval for the employees to answer the questionnaire during their working

hours. The questionnaire was estimated to take approximately 15 minutes to complete and was tested on selected employees before being distributed. A total of 1587 employees fully completed the questionnaire (response rate = 48%).

Similar to the full population, the overall sample consisted mostly of women (87%) and staff aged between 36 and 45 years old (28%) and between 46 and 55 years old (28%) (supplemental material, Table 5). Care staff, such as nurses, were the largest staff group (48%), and most respondents had more than 10 years of experience at their current hospital (47%). Except for an underrepresentation of service/technical staff, a dropout analysis of these variables showed no major systematic dropouts. Informed consent was obtained from all participants. The study was approved by the Danish Data Protection Agency (1-16-02-652-18). In accordance with Danish law, ethical approval is not required for this type of study. Study data were collected and managed using REDCap electronic data capture tools hosted at Aarhus University (Harris et al., 2019).

## 2.2. Outcome variables

### 2.2.1. Quality of health care services

The quality of health care service is highly complex and requires the systematic measurement of the key variables (Teoh et al., 2019). In the present study, the concept of the quality of health care services was divided into three types of quality: clinical quality, quality of patient involvement, and overall professional quality. These concepts were measured with self-developed scales ranging from 0 to 10 points and were inspired by previous research measuring self-reported levels of quality in a hospital context (Stalpers et al., 2016; Schmalenberg and Kramer, 2008). All personnel, including personnel without patient contact, answered questions on their self-perceived overall professional quality. Additionally, health care staff also answered questions related to their perceived clinical quality and quality of patient involvement.

Clinical quality and quality of patient involvement were measured with the following question: "On a scale from 0 to 10, on which 0 indicates the lowest possible quality, and 10 indicates the highest possible quality, how would you rate the quality of the following aspects of the work you have performed over the last six months: the clinical quality/the quality of patient involvement?" Six months was chosen as an appropriate time interval to obtain a comprehensive assessment of quality based on different work situations and work tasks.

For the assessment of overall professional quality, the question was as follows: "On a scale from 0 to 10, on which 0 indicates the lowest possible quality and 10 indicates the highest possible quality, how would you rate the overall professional quality of the work you performed during the last six months?"

Since the outcome variables were highly leftward skewed and to measure a high quality of health care services, all three quality measures were dichotomized with a cutoff greater than the median (8 for all three types) to capture only very high ratings of quality. The method was based on other similar studies (Stalpers et al., 2016; Schmalenberg and Kramer, 2008). This process resulted in three binary variables, where 9–10 indicated "high quality" and 0–8 indicated "medium/low quality" (ref).

## 2.3. Exposure variables

### 2.3.1. Social capital

Social capital was measured using the short version of the Danish social capital questionnaire developed by Borg et al. (2014). This questionnaire aims to capture a group-level construct of social capital using the methods of reference-shift consensus (van Mierlo et al., 2009). Therefore, personnel were asked to answer questions about social capital on their unit/subdepartment based on their perception of the unit perspective instead of their individual experiences.

A unit typically consists of 30–50 employees and a middle manager (e.g., a consultant and/or a nurse with department management

responsibility). As described above, the middle manager plays a key role in the theory of social capital and is the natural center of a unit. If respondents worked in several units, they were instructed to answer the questions according to their overall hospital department.

The short version of the Danish social capital questionnaire consists of four subscales for each type of social capital (Borg et al., 2014). Questions related to bonding social capital (within the same work unit) consist of four items ( $\alpha = 0.81$ ), e.g., "In my unit, we help colleagues who have too much work to do". Questions related to bridging social capital (between work units) consist of six items ( $\alpha = 0.84$ ), e.g., "Our unit and other units acknowledge each other's contributions to complete the work task". Questions regarding linking social capital in relation to immediate management (linking social capital IM) consist of four items ( $\alpha = 0.93$ ), e.g., "Our immediate manager takes our needs and views into consideration when he or she makes decisions". Finally, questions on linking social capital in relation to the top management and workplace as a whole (linking social capital W) consist of three items ( $\alpha = 0.79$ ), e.g., "A common understanding exists between the management and employees about how we complete the tasks".

Response options were coded as follows for all items: "To a very low extent" = 0; "To a low extent" = 25; "Partially" = 50; "To a high extent" = 75; and "To a very high extent" = 100. Each subscale was created using the mean values from the items, resulting in four subscales ranging from 0 to 100 points, with a higher value indicating a higher social capital score.

Workload and work pace were measured using validated scales from the Danish Psychosocial Work Environment Questionnaire (DPQ) (Clausen et al., 2019a). Workload is defined as the amount and character of work that an employee is expected to complete in a specific time. Workload consists of four items ( $\alpha = 0.86$ ), e.g., "Do you fall behind with your work tasks?" Work pace is defined as the working speed. Work pace is measured by using two items ( $\alpha = 0.71$ ), e.g., "Is it necessary to work at a high pace?" For all items, the response options were coded as follows: "Never" = 0; "Rarely" = 25; "Sometimes" = 50; "Often" = 75; and "Always" = 100. Each subscale was created using the mean values from the items, resulting in two subscales ranging from 0 to 100 points, with a higher number indicating higher workload and work pace scores.

### 2.3.2. Covariates

Age was measured in six categories: 1) 18–24 years old, 2) 25–35 years old, 3) 36–45 years old, 4) 46–55 years old, 5) 56–65 years old, and 6) > 65 years old.

Occupational group was coded into six categories: 1) administrative staff, 2) physicians, 3) care staff, 4) service/technical staff, 5) other staff, and 6) other health staff. Furthermore, sex was used as a covariate.

Years of experience was measured with the question "How long have you been employed at your current hospital?" and was categorized into six categories: 1) 0–6 months, 2) 6–12 months, 3) 1–2 years, 4) 2–4 years, 5) 4–10 years, and 6) > 10 years. Social capital includes relationships with colleagues and managers, workplace-related norms and values that vary from workplace to workplace and that might take years to internalize. Therefore, we asked respondents about their years of experience at their current hospital instead of their general experience as hospital employees.

Finally, hospital department was categorized into 24 different departments and included as a covariate in the adjusted models as a fixed effects cluster factor variable to account for the hierarchical data structure (McNeish and Kelley, 2019).

## 2.4. Analytical procedure

A binary logistic regression model was used to analyze the associations between the different types of social capital and the three different indicators of the quality of health care services.

The respondents were divided into three subsamples based on the outcome variables, since not all staff members answered all of the questions about quality. All staff groups were asked the question about general quality.

The question about clinical quality was posed to the clinical healthcare staff, and the question about the quality of the patient involvement was asked of the staff with patient contacts. Sample 1 included healthcare staff with complete information for the outcome variable of clinical quality and all predictor variables and covariates ( $N = 848$ ). Sample 2 included healthcare staff with patient contacts and complete information for the outcome variable of quality of patient involvement and all predictor variables and covariates ( $N = 840$ ). Sample 3 included all staff with complete information for the outcome variable of overall professional quality and all predictor variables and covariates ( $N = 1173$ ). These samples were used separately to analyze each outcome. All of the models were estimated as crude models without covariates (Table 2) and adjusted models with all covariates, including the hospital department, as fixed effects (Table 3). Three departments were automatically excluded from the models assessing clinical quality and the quality of patient involvement, and one department was excluded from the model assessing overall professional quality since these departments predicted failure perfectly. This process resulted in a slight decrease in sample sizes for the adjusted models.

We conducted a variance inflation factor (VIF) test to assess multicollinearity between the exposure variables. All tolerance values ( $1/VIF$ ) were greater than 0.2, indicating no problems with multicollinearity. Thus, all of the exposure variables were included in the same regression models.

Although all of the predictor variables were scaled from 0 to 100, we estimated fully standardized regression coefficients (Menard, 2011) to investigate which predictor had the largest effect.

For the exposure variables showing a statistically significant effect in the regression models, we estimated predicted probabilities for all three outcome variables (supplemental material, Figs. 2–4). First, we estimated marginal effects, which are understood as the change in the predicted probability for a high quality on the outcome measures, when the exposure variable was increased by 1. Second, we estimated adjusted predictions, which are understood as predicted probabilities for all observed values on the exposure variables. The probabilities were calculated as “average marginal effects” and “average marginal adjusted predictions” (Williams, 2012), also known as “marginal standardization” (Muller and MacLehose, 2014). This method was used to predict the estimated probabilities for each observation in the data which were then averaged.

$P$  values  $<0.05$  were considered statistically significant, and the results are presented with 95% confidence intervals. The STATA statistical software package (version 14.0; Stata, College Station, TX, USA) was used for all of the analyses.

### 3. Results

The order described below is used to provide a step-by-step presentation of the results. Table 1 presents the descriptive statistics of the study variables. Table 2 presents the crude binary logistic regression models. Table 3 presents the adjusted binary logistic regression models. Table 4 presents the average marginal effects. After these analyses, Figs. 2–4 (supplemental material) provide a more intuitive interpretation of the significant associations presented in Tables 1 to 4.

#### 3.1. Clinical quality

The results from the crude binary logistic regression analysis (Table 2, model 1) revealed highly significant positive associations of bonding and bridging social capital with high clinical quality and significant negative associations of workload and work pace with high clinical quality. When covariates were included in the model (Table 3, model 1), the

**Table 1**  
Descriptive statistics of the study variables.

Variable	Category	No. (%) or mean (SD)
High clinical quality	High	367 (33.36)
	Medium/low	733 (66.64)
High quality of patient involvement	High	302 (27.71)
	Medium/low	788 (72.29)
High overall professional quality	High	539 (33.73)
	Medium/low	1059 (66.27)
Bonding social capital		76.02 (15.30)
Bridging social capital		62.25 (15.30)
Linking social capital (IM)		73.24 (20.13)
Linking social capital (W)		61.60 (17.62)
Workload		51.48 (18.00)
Work pace		58.26 (16.55)
Age (years)	18–24	19 (1.11)
	25–35	307 (17.87)
	36–45	482 (28.06)
	46–55	487 (28.35)
	56–65	390 (22.70)
	> 65	33 (1.92)
Occupational group	Administrative staff	119 (6.85)
	Physicians	206 (11.87)
	Care staff	841 (48.44)
	Service/technical staff	127 (7.32)
	Other staff	22 (1.27)
Years of experience	Other health staff	421 (24.25)
	0–6 months	94 (5.47)
	6–12	115 (6.69)
	1–2 years	138 (8.02)
	2–4 years	177 (10.29)
	4–10 years	386 (22.44)
> 10 years	810 (47.09)	

Note: SD = Standard deviation.

associations remained statistically significant and showed no decrease in odds ratios. The marginal effects (Table 4, model 1) showed that when bonding and bridging social capital were increased by a single scale point, the predicted probability for a high clinical quality increased by an average of 0.5 percentage points. For workload and work pace, the effects were  $-0.2$  and  $-0.3$  percentage points, respectively. These results are illustrated more intuitively in Figs. 2–4 (supplemental material).

Fig. 2 (supplemental material) shows the predicted probabilities of high clinical quality for different levels of bonding social capital, bridging social capital, workload and work pace. Consistent with the marginal effects, the figure shows that bonding and bridging social capital exerted strong, positive effects on clinical quality. For example, the probability for high clinical quality changed from 0.10 to 0.54 when bridging social capital changed from the lowest to the highest observed value. In contrast, the figure showed negative, but not strong, effects of workload and work pace.

#### 3.2. Quality of patient involvement

Regarding the quality of patient involvement, the results from the crude binary logistic regression analysis (Table 2, model 2) showed significant, positive associations of bonding and bridging social capital with workload and a high quality of patient involvement. When adjusting for covariates (Table 3, model 2), the effects remained statistically significant. Furthermore, the odds ratios did not change.

The marginal effects (Table 4, model 2) showed an average increase of 0.3 percentage points for the probability of a high quality of patient involvement when bonding social capital increased by a single scale point. For bridging social capital and workload, the effects were 0.5 and  $-0.4$  percentage points, respectively.

Fig. 3 (supplemental material) shows strong effects of bridging social capital and workload; e.g., the probability for a high quality of

**Table 2**

Binary logistic regression models. Crude associations of the subtypes of social capital, workload, and work pace with high clinical quality.

	Model 1 High clinical quality			Model 2 High quality of patient involvement			Model 3 High overall professional quality		
	OR	95% CI	Std. Coeff. <sup>a</sup>	OR	95% CI	Std. Coeff. <sup>a</sup>	OR	95% CI	Std. Coeff. <sup>a</sup>
Bonding social capital	1.03 <sup>***</sup> (0.01)	(1.01; 1.04)	0.19	1.02 <sup>*</sup> (0.01)	(1.00; 1.04)	0.14	1.02 <sup>***</sup> (0.01)	(1.01; 1.04)	0.17
Bridging social capital	1.03 <sup>***</sup> (0.01)	(1.01; 1.04)	0.20	1.03 <sup>***</sup> (0.01)	(1.02; 1.05)	0.24	1.03 <sup>***</sup> (0.01)	(1.02; 1.04)	0.20
Linking social capital (IM)	1.00 (0.01)	(0.99; 1.01)	0.01	1.00 (0.01)	(0.98; 1.01)	−0.03	1.00 (0.00)	(0.99; 1.01)	0.00
Linking social capital (W)	1.01 (0.01)	(1.00; 1.02)	0.07	1.01 (0.01)	(0.99; 1.02)	0.05	1.01 (0.00)	(1.00; 1.01)	0.02
Workload	0.99 <sup>*</sup> (0.01)	(0.97; 1.00)	−0.11	0.98 <sup>**</sup> (0.01)	(0.97; 0.99)	−0.17	0.98 <sup>***</sup> (0.00)	(0.97; 0.99)	−0.19
Work pace	0.98 <sup>**</sup> (0.01)	(0.97; 0.99)	−0.14	0.99 (0.01)	(0.98; 1.01)	−0.05	0.99 (0.01)	(0.98; 1.00)	−0.08
McFadden's pseudo R <sup>2</sup>	0.14			0.11			0.12		
N	848			840			1173		

Note: OR = odds ratio. Standard error in parentheses.

<sup>a</sup> = fully standardized regression coefficient.

\* P&lt;0.05.

\*\* P&lt;0.01.

\*\*\* P&lt;0.001.

patient involvement changed from 0.06 to 0.49 when bridging social capital changed from the lowest to the highest observed value.

### 3.3. Overall professional quality

The results from the crude analysis showed highly significant positive associations of bonding and bridging social capital with high overall professional quality. Furthermore, a highly significant negative association was observed between work pace and high professional overall quality in the crude model (Table 2, model 3). After adjusting for covariates (Table 3, model 3), the associations remained highly significant, with no decrease in the odds ratios.

The marginal effects (Table 4, model 3) showed that when bonding social capital increased by a single scale point, the predicted probability for high clinical quality increased by an average of 0.4 percentage points. For bridging social capital and workload, the effects were 0.5 and −0.4 percentage points, respectively.

Fig. 4 (supplemental material) shows strong effects of all three predictors. However, the strongest effect was observed for bridging social

capital, for which the probability for a high overall professional quality changed from 0.08 to 0.60 (P < 0.001) when bridging social capital changed from the lowest to the highest observed value.

## 4. Discussion

To our knowledge, the present study is the first to compare the effects of social capital with the effects of work pace and workload on the quality of health care services. Overall, these new results show that bridging social capital exerts a stronger positive effect than the negative effects of workload and work pace on the quality of health care services. Bonding social capital exerts an effect comparable to the negative effect of work pace and a stronger effect than workload on the quality of health care. In conclusion, our study suggests that social capital is at least as important for the quality of hospital services as the well-known risk factors for quantitative job demands in a hospital setting. The effect sizes in our models (odds ratios) might seem small at first glance, because our measure for social capital was coded from 0 to 100. This range corresponds to a change in the predicted probability of

**Table 3**

Binary logistic regression models. Adjusted associations of the subtypes of social capital, workload, and work pace with high clinical quality, high quality of patient involvement and high overall professional quality.

	Model 1 High clinical quality			Model 2 High quality of patient involvement			Model 3 High overall professional quality		
	OR	95% CI	Std. Coeff. <sup>a</sup>	OR	95% CI	Std. Coeff. <sup>a</sup>	OR	95% CI	Std. Coeff. <sup>a</sup>
Bonding social capital	1.03 <sup>***</sup> (0.01)	(1.01; 1.05)	0.20	1.02 <sup>*</sup> (0.01)	(1.00; 1.04)	0.14	1.02 <sup>**</sup> (0.01)	(1.01; 1.03)	0.15
Bridging social capital	1.03 <sup>***</sup> (0.01)	(1.01; 1.04)	0.19	1.03 <sup>***</sup> (0.01)	(1.02; 1.05)	0.22	1.03 <sup>***</sup> (0.01)	(1.02; 1.04)	0.20
Linking social capital (IM)	1.01 (0.01)	(0.99; 1.02)	0.06	1.00 (0.01)	(0.99; 1.01)	−0.01	1.00 (0.00)	(0.99; 1.01)	0.03
Linking social capital (W)	1.01 (0.01)	(1.00; 1.03)	0.10	1.01 (0.01)	(0.99; 1.02)	0.07	1.01 (0.01)	(1.00; 1.02)	0.06
Workload	0.99 <sup>*</sup> (0.01)	(0.97; 1.00)	−0.11	0.98 <sup>**</sup> (0.01)	(0.96; 0.99)	−0.20	0.98 <sup>***</sup> (0.01)	(0.97; 0.99)	−0.17
Work pace	0.98 <sup>*</sup> (0.01)	(0.97; 1.00)	−0.12	1.00 (0.01)	(0.99; 1.02)	0.00	0.99 (0.01)	(0.98; 1.00)	−0.07
McFadden's pseudo R <sup>2</sup>	0.20			0.13			0.16		
N	837			829			1162		

Note: OR = odds ratio. Standard error in parentheses. Adjusted for years of experience, occupational group, sex and hospital department.

<sup>a</sup> = fully standardized regression coefficient.

\* P&lt;0.05.

\*\* P&lt;0.01.

\*\*\* P&lt;0.001.

**Table 4**

Average marginal effects of social capital, workload and work pace on the probabilities of high clinical quality, high quality of patient involvement and high overall professional quality.

	Model 1 High clinical quality		Model 2 High quality of patient involvement		Model 3 High overall professional quality	
	Marginal effect	(95% CI)	Marginal effect	(95% CI)	Marginal effect	(95% CI)
Bonding social capital	0.005***	(0.003; 0.008)	0.003*	(0.001; 0.006)	0.004**	(0.002; 0.006)
Bridging social capital	0.005***	(0.002; 0.007)	0.005***	(0.003; 0.007)	0.005***	(0.003; 0.007)
Workload	-0.002*	(-0.005; -0.001)	-0.004**	(-0.006; -0.002)	-0.004***	(-0.006; -0.002)
Work pace	-0.003*	(-0.006; -0.001)	-	-	-	-

Adjusted for years of experience, occupational group, sex and hospital department.

\* P&lt;0.05.

\*\* P&lt;0.01.

\*\*\* P&lt;0.001.

a self-reported high clinical quality from only 10% for the lowest reported bridging social capital to 54% at the highest reported bridging social capital. We believe that this difference indicates a substantial and potentially clinically significant association. By directly comparing the effects of social capital and quantitative job demands and by focusing on the practical effects rather than statistical significance, this study provides important knowledge for researchers, as well as politicians and decision makers in hospitals, regarding the most important factors in the work environment.

Based on a comprehensive review, Teoh et al. concluded that a relationship exists between the psychological work environment for hospital staff and the quality of health care services. Hence, the psychosocial work environment in hospitals might result in major social and health consequences, not only for employees but also for patients, who are the ultimate recipients of health care services, and therefore for society as a whole. However, Teoh et al. also concluded that more systematic studies of this relationship based on a comprehensive and internationally recognized theoretical understanding of working conditions and quality are needed. The theory of social capital focuses on social capital mainly as a positive factor in the work environment. The concept has recently been revised with the identification of three subtypes of social capital: bonding, bridging and linking social capital. Few previous studies have investigated the potential effect of social capital on the quality of health care services in a hospital environment. These studies did not divide social capital into different subtypes of social capital or compare the effects of psychosocial risk factors in the work environment, such as high quantitative job demands. Thus, our results are not directly comparable with the existing research. However, the study provides new insights into the role of social capital as an important contributor to the quality of care in a hospital.

In summary, the analyses showed significant positive associations of bonding and bridging social capital with all three types of quality and significant negative associations between workload and all three types of quality, whereas work pace only was negatively associated with clinical quality. Overall, bridging social capital exerted the largest effect on all three types of quality.

The concept of relational coordination, which is defined by Gittell et al. (2010 page 492) as "a mutually reinforcing web of communication and relationships carried out for the purpose of task integration", is a concept closely related to social capital, particularly bridging social capital (Albertsen et al., 2014). Gittell emphasized that hospitals are notorious for operating within well-defined silos that engender turf battles between them, whereas relational coordination is critical for achieving desired performance outcomes in this setting due to the high levels of task interdependence, uncertainty, and time constraints (Gittell, 2000). As an example, a study by Gittell et al. (2010) in a hospital setting showed that relational coordination mediates the associations between high-performance work practices and quality and efficiency outcomes.

The finding that linking social capital related to immediate management and linking social capital related to the top management of the hospital and workplace as a whole did not have any effects of any type of quality might seem surprising. Most work environment research

has emphasized the importance of top and middle managers for organizational changes, organizational culture and the coordination of the work environment in general (Kotter, 2008; Hale et al., 2010). However, previous reviews have reported mixed effects of the quality of management on different aspects of quality. Wong et al. (2013) provided evidence for a clear relationship of relational leadership styles for nurses with lower patient mortality and reduced medication errors, restraint use, and hospital-acquired infections. In contrast, only a few studies included in a recent review supported the importance of leadership for the quality of health care services (Teoh et al., 2019). Hence, the quality of health care seems to be more complex than the outcome measures mentioned above and might be due to the direct effect of the employees on the results. Another potential explanation is that bonding and bridging social capital mediate the relationship between linking social capital and quality, which might explain the lack of effect in our models including all types of social capital. The effect from linking social capital is potentially moderated by the effect of bonding or bridging social capital; e.g., linking social capital might only exert a positive effect on employees with low bonding and/or bridging social capital. These hypotheses must be tested by conducting further analyses.

#### 4.1. Theoretical considerations

Since the revised theory of social capital is relatively new, especially from an international perspective, we would like to discuss the conditions that should be present for the results of this study to be applied elsewhere. The theory of social capital focuses on the collective resources in the networks between employees in the work unit, between units and between employees and their middle manager(s) and top managers. This study includes employees from all staff categories, and the importance of social capital as a valuable organizational resource is confirmed. Additionally, the important role of work teams supporting the psychological work environment is also confirmed. However, a few remarks should be added. Social capital requires five factors, the first four of which are as follows: 1) the opportunity to participate in social networks and information sharing; 2) shared understanding of key job tasks, how cooperation should work, goals and visions of the department or the organization and shared norms for the actions needed to complete the task well; 3) quality in the relationship, which is understood as trust and feelings of justice (procedural and practical); and 4) shared motivation for the collective action, which might not result in any immediate gains in the short term (Borg, 2018, p. 7). Hence, job commitment, a shared understanding of job tasks and work procedures, and a longer time perspective are needed. Finally, (5) the employees must have the social competencies to participate in the social network. Employees with language barriers or a limited understanding of the values and norms of the groups might not be able to decode the actual meaning of spoken words and actions. This study was conducted in a Danish hospital setting where all these preconditions were fulfilled – not least because of the relatively low turnover at the hospital, at approximately 14% pr. year; the strong networks in each unit; and the homogeneity of the employees (Region Midtjylland, 2020). Studies in



other settings with more nationalities represented and a less homogeneous group of employees might yield different results. With these reservations, this study adds to the revised theory of social capital by showing the relationship between linking social capital and the quality of health care services.

#### 4.2. Limitations and future research

This study had some limitations that should be addressed. First, a cross-sectional design was used; thus, no causal conclusions could be drawn. To our knowledge, only a few studies investigating interventions aimed at enhancing social capital have been published (Andersen et al., 2015; Framke et al., 2019; Meng et al., 2020; Sun et al., 2014). Therefore, further studies are needed to investigate methods to enhance social capital in the workplace and subsequently test the possible causal effects of these specific social capital interventions on the quality of health care services. Second, the study used self-reported data, which might have led to social desirability bias, in which the respondents either over- or underreported their answers based on social norms (Tourangeau and Yan, 2007). This bias in particular could be a problem for the questions assessing the quality of health care services, since these exact questions were not used or validated in previous studies. Third, the response rate of the study was 48%, which is considered high, and no major systematic dropout was identified. However, since participation in the study was voluntary, we do not know whether the sample is fully representative of key variables for the population. This fact may potentially have led to biased results and weakened the external validity of the findings. However, since administrative data on occupational group and sex were available for the entire study population (supplemental material, Table 5), inverse probability weighting was tested to account for this issue. Since the results did not differ substantially, we conducted all the analyses without the use of weighing techniques. Fourth, six months was chosen as the time period in the self-reported assessments of the quality of health care services. Other studies (e.g., Rasmussen et al., 2014) have used a larger number of day-to-day assessments over the period of one month. Due to the large sample size and the study design, this approach was not possible in our study. Social capital is a highly complex and dynamic concept and can work very well, depending on other employee characteristics. Hence, future studies could include possible moderators of the relationship between different types of social capital and the quality of hospital services, e.g., sex, psychological and physical health and job experience. Finally, hospitals are very complex organizations. Future in-depth qualitative studies should increase the internal validity of the findings of this study and identify relevant mechanisms that influence the association between social capital and the quality of hospital services.

#### 5. Conclusions

Hospitals must deliver high-quality health care services in terms of clinical quality, quality of patient involvement and overall professional quality under high pressure for efficiency and with responsibility for patients' lives. This fact may have consequences for employees, the quality of health care service and ultimately the health of patients. Hence, synergies between the psychosocial work environment and the quality of health care must be identified, and both factors should be prioritized. Based on questionnaire data from 1589 Danish hospital employees, the objective of this study was to investigate the associations of bonding, bridging, and two types of linking social capital with the self-reported quality of health care services. Additionally, we compared the effects of these different types of social capital with the effects of workload and work pace on the quality of health care services.

Our findings show strong positive associations of bridging and bonding social capital with the quality of health care services. Overall, bridging social capital exerted the largest effect on clinical quality, the quality of patient involvement and overall professional quality, whereas

bonding social capital generally had a slightly smaller effect. This effect was, however, still comparable with the negative effect of workload. These findings indicate the importance of well-functioning relationships within and especially between hospital units as a positive psychosocial factor with effects comparable to or even more important than workload on the quality of health care services. Finally, we recommend including bonding and bridging social capital in hospital strategies and in guidelines for the work environment to potentially improve the quality of health care services and the quality of work for health care professionals. However, further studies are needed to test the potential causal effect of specific social capital interventions on the quality of health care services.

#### Data availability statement

Due to the sensitive nature of the questions asked in this study and the Danish GDPR-rules of confidentiality, survey respondents were assured raw data would remain confidential and would not be shared

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#### CRediT authorship contribution statement

**Louise Møller Pedersen:** Conceptualization, Methodology, Formal Analysis, Validation, Investigation, Resources, Data Curation, Writing - Original Draft, Visualization, Supervision, Project administration, Funding acquisition. **Andreas Lindegaard Jakobsen:** Conceptualization, Methodology, Validation, Formal Analysis, Investigation, Resources, Data Curation, Writing - Original Draft, Visualization. **Henriette Nørmølle Buttenschøn:** Validation, Resources, Writing - Review & Editing. **Annette Haagerup:** Writing - Review & Editing, Resources. **Lasse Plougstrup Hansen:** Funding acquisition.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnurstu.2022.104380>.

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