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TEAMWORK: A PERSPECTIVE OF PERIOPERATIVE NURSES

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Abstract

Aim: This paper aims to analyse perioperative nurses' views of teamwork through team membership, team functionality, team cohesion, and team members' professionalism. *Design:* A descriptive, cross-sectional study. *Methods:* A questionnaire was sent to perioperative nurses working in one hospital district in Finland (n = 96). Data was collected by the Teamwork Scale and statistically analysed. *Results:* Perioperative nurses experienced teamwork positively. Team membership was associated with primary operating room (OR) role, engagement in the workplace, and perceived work empowerment. Team functionality was associated with combined OR role, working experience in healthcare, working experience as a perioperative nurse, and working shift. Team cohesion was associated with working shift and engagement in the workplace. Team members' professionalism was associated with engagement in the workplace, employment, and perceived work empowerment. *Conclusion:* Perioperative nurses' primary OR role and working shift had several connections to teamwork. This should be taken into careful consideration by OR managers in their daily work.

Keywords: operating room, perioperative nurse, questionnaire, teamwork.

Introduction

In the operating room (OR) environment, effective teamwork is essential to avert life-threatening events. Safety in surgery needs a reliable execution of procedures by a team consisting of several kinds of healthcare professionals (World Health Organisation, 2009). The OR environment requires interprofessional collaboration, and good OR teamwork skills are associated with reducing errors during operations (Catchpole, 2010), as well as enhancing job satisfaction and a commitment to work (Buttigieg et al., 2011). It is important to focus on psychological safety, situation assessment, shared mental models, and team leadership behaviours. These factors are moderated by communication and organizational conditions (Gregory et al., 2021).

However, cohesive multidisciplinary teams are not self-evident, and perceptions of ideal teamwork (Aveling et al., 2018) and communication (Cumin et al., 2017) can vary. Interpersonal and social aspects shape team behaviour in surgery (Kurmann et al., 2014). Professional cultures can limit interprofessional collaboration, and when team roles

are strictly defined, team dialogue and shared understanding can be limited (Gillespie et al., 2010). In order to plan and develop effective OR functioning, it is necessary to understand the factors that affect teamwork (Gillespie et al., 2010). Therefore, the aim of this paper is to analyse perioperative nurses' views of teamwork.

Background and literature review

Teams and teamwork. Katzenbach and Smith (2005) define "a team is a small group of people with complementary skills who are committed to a common purpose, a set of performance goals, and a common approach for which they hold themselves mutually accountable". In a good team, the members have technical or functional expertise and problem-solving, decision-making, and interpersonal skills, and they assign themselves specific tasks and stick to schedules (Katzenbach & Smith, 2005). Ideally, the team members interact adaptively, interdependently, and dynamically (Salas et al., 2005). Teamwork refers to the information exchange, cognitions, and attitudes that make interdependent performance possible in the team. Effective teamwork requires multiple opportunities to interact, as well as task interdependence (Salas, 2012). Teamwork is accomplished through collaboration, open communication, and shared decision-making

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(Xyrichis & Ream, 2008). In this study, OR teamwork is examined from the viewpoints of team membership, team functionality, team cohesion, and team members' professionalism.

Team membership. Team membership in the operating room can be diverse. Members of the OR team perform complex and varied functions interdependently (Salas et al., 2008). Team members are part of sub-teams defined as surgical and anaesthesia teams or nurse and doctor teams. Sub-teams may even subdivide according to team members' primary responsibilities (Nakarada-Kordic et al., 2016). OR team members have distinct roles and can have varied views of objectives (Bogdanovic et al., 2015; Nakarada-Kordic et al., 2016). Moreover, an OR team's ability to collaborate depends on the work context, and involves nested and cross-sectional identities, diversity, and support (Kennedy et al., 2020). Team members are required to interact cooperatively with each other, and to have a shared understanding of team members' knowledge, skills, and experiences (Salas et al., 2005).

Team functionality. Team functionality refers to the quality or state of being functional (Merriam-Webster, n.d.) and is closely associated with team performance. In a well-functioning surgical team, members anticipate each other's needs and coordinate their work in a common direction. Team members are expected to stay focused on the OR activity, even when they do not actively participate (Aveling et al., 2018). A successful OR team can communicate openly regardless of role hierarchy, and balance the workload by helping each other (Aveling et al., 2018; Bogdanovic et al., 2015). The OR team's "shared mental model" fosters communication and enhances patient safety (Gillespie et al., 2010). Still, latent cultural factors can have a negative impact on communication in OR teams (Kirschbaum et al., 2018). Especially, any disruptive behaviour in the OR may decrease team clinical performance and patient safety, so it is important to pay attention to the way that disruptive behaviour is responded to and addressed (Villafranca et al., 2018). As a further consideration, a lack of familiarity among team members hinders team functionality. Participating in preoperative briefings and getting to know each other's first names can promote intra-team communication (Gillespie et al., 2013). But when team members change, a team's coordination can decline and team performance can be impaired (Summers et al., 2012).

Team cohesion. Team cohesion can be understood as one of the qualitative dimensions that determines the team climate. To some extent cohesion is good for team performance, but at high levels it can lead to a resistance to change (Sudhakar, 2013). Team cohesion can also be defined as the team members' inclination to form social bonds and thus foster a united team (Casey-Campbell & Martens, 2009). Interpersonal interaction, small team size, and physical proximity foster team cohesion, and the team's maturity and interpersonal attraction develop after working together over time (Rydenfält et al., 2017). Still, cohesion can also be interrupted when team members change (McClurg et al., 2017). Previous research has shown that cohesion in teams can be observed through the dimensions of group pride, task cohesion, and social cohesion, but it is challenging to measure cohesion in teams such as surgical teams, in which members only spend a short amount of time together (McClurg et al., 2017).

Team members' professionalism. Perioperative nurses' professional competence is described as the coalescence of theoretical, practical, situational, and aesthetic knowledge (Gillespie et al., 2009). Both technical and non-technical competence is valued among OR personnel (Aveling et al., 2018). Non-technical skills can be seen as cognitive and interpersonal abilities, such as cooperation, leadership, situational awareness, and decision-making (Fasoi et al., 2019), which foster OR team performance (Catchpole, 2010). A perioperative nurse's work centres upon managing the flow of OR procedures and keeping the patient safe (McGarry et al., 2018). Highly developed communication skills are seen as important aspects of competence (Gillespie et al., 2009). The team members' professionalism promotes trust and efficient teamwork, and can manifest as constructive and nonverbal communication (Sandelin et al., 2019). Additionally, a perioperative nurse's professionalism has been shown to be enhanced in teams that share knowledge and communicate in a way that maximizes learning opportunities (Bezemer et al., 2016). In Finland, registered nurses receive an education at universities of applied sciences (Bachelor's degree, 210 ECTS credits, 3,5 years). During the final academic year, nursing students have advanced studies (30 ECTS credits) and they can, for example, specialize in perioperative nursing, including both circulating nursing and anaesthesia nursing care. In Finland, an OR team consists of a surgeon, an anaesthesiologist, a scrub nurse, a circulating nurse, a nurse anaesthetist, and healthcare students. The perioperative nurses' team consists of three nurses: a scrub / instrument nurse, a circulating nurse (hereafter referred to as "scrub nurses") and a nurse anaesthetist. The scrub nurse

works directly with the surgeon, the nurse anaesthetist assists the anaesthesiologist and monitors the patient throughout their OR treatment path, and the circulating nurse assists the OR staff present. Generally, a perioperative nurse's work takes place in three shifts throughout the day, normally divided into morning / day shifts, evening shifts, and night shifts.

Engagement in the workplace and perceived work empowerment. Employee engagement can be defined as an active and fulfilling concept reflecting coexisting physical, affective, and cognitive energies that benefit both the organisation and the employee (Eldor & Vigoda-Gadot, 2017). Hospitals will perform better over time if their employees are engaged in what they do (Brunges & Foley-Brinza, 2014). Furthermore, employee empowerment can involve themes of power sharing, participative decision-making, the devolution of responsibility, and a people-oriented leadership style (Huq, 2015). Further, for example, structural empowerment can enable perioperative nurses to provide important input through which the OR work can be developed in a positive direction (Walker et al., 2011).

Aim

This study aimed to investigate the perception of teamwork through the sub-dimensions of team membership, team functionality, team cohesion, and team members' professionalism, as well as their engagement in the workplace and perceived work empowerment, from the perspective of perioperative nurses.

Methods

Design

A quantitative cross-sectional approach was used.

Sample

The study population consisted of perioperative nurses (nurse anaesthetists, scrub nurses, and circulating nurses) in one of the 20 hospital districts in Finland (n = 336). Research permissions were obtained from five hospitals with 10 OR units within the district. These OR units provided, for example, day surgery, general surgery, orthopaedics, urology, neurosurgery, and many other speciality / sub-specialty areas.

Data collection

Each OR working unit had a contact person who sent details of the study and a hyperlink to the questionnaire to the nurses. The participants were sent three reminders. Research data was collected from September to October 2014. The study was

conducted in accordance with the guidelines of the WMA Declaration of Helsinki (World Medical Assosiation, 2018). Participation was voluntary and anonymity was assured, thus the reasons for non-participation were not collected. Completing the electronic questionnaire via the internet was assumed as consent to participate.

The questionnaire included a Teamwork Scale developed by the authors based on a literature review. Further questions were included that provided information on the background variables of respondents. The Teamwork Scale includes 37 statements and has four sub-dimensions: team membership (12 statements: e.g., My own role as a team member is clear; I feel that my opinions are valued), team functionality (7 statements: e.g., Being one step ahead is an important part of working; In a tense atmosphere, the functioning of the team can be disrupted even by small things), team cohesion (4 statements: e.g., I find nurses work together to get things done; I get help from other nurses when needed), and team members' professionalism (14 statements: e.g., Based on feedback, I strive to develop my professional skills; I admit that I have so-called tacit information). All statements are rated on a 7-point Likert scale (1 – strongly disagree to 7 – strongly agree).

Background variable questions consisted of 13 items concerning demographic variables (Table 1), 6 items addressing Engagement in the workplace, and 3 items addressing Perceived work empowerment (Table 2). Engagement in the workplace questions were evaluated on a 5-point Likert scale (1 – the weakest evaluation to 5 – the strongest evaluation). Perceived work empowerment questions were evaluated on a 6-point Likert scale (1 – very poor to 5 – very good, and 6 – don't know).

Owing to this being the first time each respondent used the NCI (Nursing Context Index) instrument in the OR context, the questionnaire pilot testing was conducted before data collection (n = 20). The pre-test was performed from June–July 2014. Based on this, some minor linguistic clarifications were made, but the main structure and content did not change, and the content validity was indicated. The pilot material was not included into the data sample. The pre-test data was not included in the reported study data.

Data analysis

Background variables were analysed using descriptive statistics and those are presented as numbers and percentages. The distributions of the research variables were examined using histograms

Table 1 Descriptive demographics of participants (n = 96)

Demographics		n	%
Gender	female	93	97.0
	male	3	3.0
Age	≤ 33	30	31.3
	34–44	32	33.3
	≥ 45	34	35.4
Highest educational level	registered nurse	89	93.0
	master's degree or other	7	7.0
Working unit	general surgery	36	37.5
	special surgery	37	38.5
	local hospital surgery	23	24.0
Primary OR role	nurse anaesthetist	48	50.0
	scrub nurse	48	50.0
Combined OR role		42	44.0
Other tasks along primary task (e.g., inducting new staff, updating instructions, drug and supply orders, shift planning)		80	83.0
Total working experience in healthcare (years)	≤ 9	27	30.3
	10–19	35	39.4
	≥ 20	27	30.3
Total working experience in OR nursing (years)	≤ 9	37	40.0
	10–14	27	29.0
	≥ 15	29	31.0
Total working experience in current OR (years)	≤ 4	35	38.0
	5–9	30	33.0
	≥ 10	26	29.0
Employment	permanent	81	84.0
	temporary	15	16.0
Working time	full-time	90	94.0
	part-time	6	6.0
Working shift	day shift	44	45.8
	two shift	14	14.6
	three shift	38	39.6

and the Kolmogorov-Smirnov test of normality, together with measures of skewness and kurtosis.

The distributions were considered to be normal. The background variables of meaningfullness of work, challenge of work, variability of work, work appreciation, rewards of work, and joy of work were formed as a summed variable of *Engagement in the workplace*. The summed variable was recoded in binary dimensions of poor (1–3) and good (4–5). Perceived work ability, coping at work, and opportunities for decision-making were formed as the summed variable *Perceived work empowerment*. This summed variable was recoded in binary dimensions of weak (1–3) and strong (4–5, 6 excluded). The internal consistency reliability (Cronbach's alpha coefficient) was measured from these two summed variables and the alpha values were acceptable.

From the Teamwork Scale items, 10 of the total 37 were reversed. Also, all four sub-dimensions of the Teamwork Scale were formed as summed variables and had acceptable Cronbach's alpha coefficient values. Higher scores represent higher

levels of agreement with the teamwork sub-dimensions. Due to the relatively small sample size (n = 96), associations between background variables and Teamwork Scale responses were established using Kruskal-Wallis H and Mann-Whitney U tests. Median tests (Bonferroni) for K samples were used to compare medians across groups. The significance level was set at < 0.05, and differences with a statistical significance are reported. All statistical analyses were performed using the IBM SPSS Statistics 25 program.

Results

Participants' demographic information

The overall response rate was 28.6% (n = 96). Respondents were aged between 23 and 62 years of age (mean 40). Most of the respondents were registered nurses (93%). Almost two out of five worked in specialist surgical areas. Most of the respondents had permanent employment (84%). Almost half of the respondents had a combined role in the OR (44%), meaning they shifted from scrub

nurse to nurse anaesthetist and vice versa. Most of the respondents (83%) also had other tasks alongside their primary OR role. Over half had 10 or more years of experience in the OR (60%), and 5 or more years of experience in their current OR (62%). Most of the respondents worked full-time (94%) and almost half of the respondents worked dayshifts (46%) – (Table 1).

Engagement in the workplace and perceived work empowerment

More than half (53%) of the nurses experienced engagement in their workplace as being good (mean = 3.6; SD = 0.7). Variability of work (mean = 4.0; SD = 0.9), challenge of work (mean = 4.0; SD = 0.8), meaningfullness of work (mean = 3.9; SD = 0.8), and joy of work (mean = 3.7; SD = 0.8) were experienced as quite good. Nurses experienced work appreciation (mean = 2.9; SD = 1.0) as poor. Less than half (44%) perceived their work empowerment as strong. Although nurses perceived their working ability (mean = 4.5; SD = 0.6) as strong and their coping at work (mean = 4.2; SD = 0.6) as quite strong, they perceived only weak opportunities for decision-making (mean = 2.8; SD = 0.9). Also, nurses experienced their rewards of work as poor (mean = 3.19; SD = 0.96) (Table 2).

Table 2 Itemized variables of engagement in the workplace and perceived work empowerment

	n	%[a]	mean	SD	Md	Q_1	Q_3	α
Engagement in the workplace	95	53	3.61	0.65	3.67	3.17	4.17	0.843
variability of work	96	76	4.02	0.91	4.00	4.00	5.00	
challenge of work	96	75	4.00	0.81	4.00	3.25	5.00	
meaningfullness of work	96	75	3.91	0.76	4.00	3.25	4.00	
joy of work	95	58	3.66	0.78	4.00	3.00	4.00	
rewards of work	96	36	3.19	0.96	3.00	3.00	4.00	
work appreciation	96	32	2.94	0.99	3.00	2.00	4.00	
Perceived work empowerment	96	44	3.84	0.53	3.67	3.33	4.33	0.589
working ability	96	96	4.50	0.58	5.00	4.00	5.00	
coping at work	96	90	4.19	0.60	4.00	4.00	5.00	
opportunities for decision-making	96	22	2.82	0.91	3.00	2.00	3.00	

[a]*Including answers of good and very good; Md – median; SD – standard deviation; Q_1 – lower quartile; Q_3 – upper quartile; α – Cronbach's alpha coefficient*

Perceptions of teamwork

Overall, nurses experienced teamwork in their ORs as positive. The sub-dimensions of team functionality (mean = 5.6; SD = 0.6) and team membership (mean = 5.3; SD = 0.8) were evaluated the highest. The sub-dimensions of team cohesion (mean = 4.9; SD = 0.7) and team members' professionalism (mean = 4.8; SD = 0.5) were evaluated at an average level (Table 3).

Team membership had statistically significant differences with regard to the primary OR role (p = 0.005), engagement in the workplace (p = 0.003), and perceived work empowerment (p = 0.004). Scrub nurses (Md = 5.6; Q_1 = 5.3; Q_3 = 6.1) experienced team membership more strongly than nurse anaesthetists did (Md = 5.2; Q_1 = 4.3; Q_3 = 5.5) (Table 4). Nurses who experienced engagement in the workplace as being good evaluated team membership (Md = 5.6; Q_1 = 5.3; Q_3 = 6.1) more highly. Furthermore, when nurses perceived work empowerment as being strong, their experience of team membership (Md = 5.4; Q_1 = 5.3; Q_3 = 6.2) was higher (Table 5).

Working unit was associated with team functionality (p = 0.022), and compared to local hospital or specialist surgery, team functionality was experienced highest in the area of general surgery (Md = 5.9; Q_1 = 5.4; Q_3 = 6.1). The primary OR role did not affect the experience of team functionality,

Table 3 Summed variables of teamwork sub-dimensions

	n	mean	SD	Md	Q_1	Q_3	α
Teamwork[a]							
team functionality	77	5.55	0.60	5.57	5.14	6.00	0.665
team membership	65	5.32	0.77	5.33	4.96	5.88	0.901
team cohesion	66	4.87	0.68	4.75	4.44	5.31	0.552
team members' professionalism	69	4.82	0.48	4.86	4.50	5.21	0.708

[a]*Higher score represent a higher level of agreement with teamwork sub-dimensions; Md – median; SD – standard deviation; Q_1 – lower quartile; Q_3 – upper quartile; α – Cronbach's alpha coefficient*

Table 4 Teamwork factors experienced by respondents (n = 96) (Part 1).

Variables	Team membership				Team functionality			
	Md	Q₁	Q₃	p-value	Md	Q₁	Q₃	p-value
Age				0.626				0.097
≤ 33	5.42	5.08	5.92		5.57	5.14	5.96	
34–44	5.25	4.92	6.08		5.79	5.29	6.25	
≥ 45	5.33	4.58	5.67		5.43	5.00	5.86	
Educational level				0.140				0.345
registered nurse	5.33	4.92	5.67		5.57	5.14	6.00	
master's degree / other	5.88	5.33	6.08		5.71	5.57	6.00	
Working unit				0.650				0.022
general surgery (1)	5.33	4.67	5.92		5.86	5.39	6.14	1 > 3; p = 0.022ᵃ
special surgery (2)	5.33	5.02	5.71		5.57	5.11	5.86	
local hospital surgery (3)	5.58	5.00	6.00		5.43	4.93	5.71	
Employment				0.077				0.305
permanent	5.33	4.85	5.67		5.57	5.14	6.00	
temporary	6.08	5.17	6.50		5.64	5.39	6.14	
Primary OR role				0.005				0.732
nurse anaesthetist	5.17	4.33	5.50		5.57	5.21	5.93	
scrub nurse	5.58	5.25	6.08		5.57	5.14	6.11	
Combined OR role				0.548				0.002
yes	5.33	5.00	5.71		5.43	5.11	5.61	
no	5.33	4.92	6.08		5.71	5.43	6.14	
Extra work responsibilities				0.902				0.356
yes	5.38	4.92	5.90		5.57	5.14	6.00	
no	5.33	5.17	5.88		5.64	5.25	6.00	

Table 4 Teamwork factors experienced by respondents (n = 96) (Part 2)

Variables	Team cohesion				Team members' professionalism			
	Md	Q₁	Q₃	p-value	Md	Q₁	Q₃	p-value
Age				0.483				0.398
≤ 33	4.75	4.50	5.44		5.57	5.14	5.96	
34–44	4.75	4.25	5.00		5.79	5.29	6.25	
≥ 45	5.00	4.25	5.75		5.43	5.00	5.86	
Educational level				0.745				0.336
registered nurse	4.75	4.50	5.31		5.57	5.14	6.00	
master's degree / other	4.50	4.25	6.06		5.71	5.57	6.00	
Working unit				0.469				0.985
general surgery (1)	4.75	4.25	5.25		4.96	4.39	5.21	
special surgery (2)	4.75	4.25	5.50		4.82	4.48	5.21	
local hospital surgery (3)	4.75	4.56	5.63		4.86	4.64	5.07	
Employment				0.714				0.022
permanent	4.75	4.25	5.50		4.82	4.50	5.07	
temporary	5.00	4.56	5.25		5.29	4.43	5.43	
Primary OR role				0.023				0.062
nurse anaesthetist	4.63	4.25	5.00		4.75	4.38	5.05	
scrub nurse	5.00	4.69	5.50		5.00	4.64	5.21	
Combined OR role				0.800				0.985
yes	4.75	4.44	5.50		4.86	4.63	5.09	
no	4.75	4.31	5.25		4.86	4.43	5.21	
Extra work responsibilities				0.130				0.627
yes	4.75	4.25	5.25		4.86	4.43	5.21	
no	5.00	4.81	5.50		4.93	4.50	5.21	

Higher scores represent a higher level of agreement with teamwork sub-dimensions; ᵃMedian test, pairwise comparisons (Bonferroni); Md – median; SD – standard deviation; Q₁ – lower quartile; Q₃ – upper quartile

although having a combined OR role stood out in the results (p = 0.002), and nurses with a combined OR role experienced team functionality (Md = 5.4; Q₁ = 5.1; Q₃ = 5.6) as being lower than those without a combined role (Md = 5.7; Q₁ = 5.4; Q₃ = 6.1). (Table 4). Working experience in healthcare (p = 0.007), experience as a perioperative nurse (p = 0.007), and experience in current OR (p = 0.035)

were also associated with team functionality. Nurses with over 9 but less than 20 years of experience in healthcare experienced team functionality higher (Md = 5.9; Q_1 = 5.4; Q_3 = 6.1) than those who had working experience of 20 years or more (Md = 5.4; Q_1 = 5.0; Q_3 = 5.8). Also, those nurses who had over 9 years but less than 15 years of experience as a perioperative nurse experienced team functionality higher (Md = 5.9; Q_1 = 5.4; Q_3 = 6.2) than those with a working experience of 9 years or less (Md = 5.6; Q_1 = 5.1; Q_3 = 5.8) or 15 years or more (Md = 5.4; Q_1 = 5.0; Q_3 = 5.7). Those nurses who had over 4 years but less than 10 years of experience in the current OR (Md = 5.7; Q_1 = 5.6; Q_3 = 6.1) experienced team functionality higher than those who had a working experience of 10 years or more (Md = 5.4; Q_1 = 4.9; Q_3 = 5.9). Furthermore, team functionality had a statistically significant relationship with working shift (p = 0.001). Those nurses who worked day shifts had a lower experience of team functionality (Md = 5.4; Q_1 = 4.9; Q_3 = 5.7) than those who worked in a three-shift rotation (Md = 5.7; Q_1 = 5.5; Q_3 = 6.1) (Table 5).

The primary OR role was associated with team cohesion (p = 0.023). Scrub nurses' experiences of team cohesion were stronger (Md = 5.0; Q_1 = 4.7; Q_3 = 5.5) than those of nurse anaesthetists (Md = 4.6;

Q_1 = 4.3; Q_3 = 5.0) (Table 4). Furthermore, team cohesion had a statistically significant association with working shift (p = 0.002), with three-shift work having the lowest level of team cohesion (Md = 4.5; Q_1 = 4.3; Q_3 = 4.8) compared to day shift (Md = 5.0; Q_1 = 4.5; Q_3 = 5.5) and two-shift (Md = 5.0; Q_1 = 4.8; Q_3 = 6.0). Also, the experience of engagement in the workplace was associated with a higher experience of team cohesion (p = 0.003). Nurses who experienced engagement in the workplace as good (Md = 5.0; Q_1 = 4.5; Q_3 = 5.6) valued team cohesion higher than those nurses who did not (Md = 4.8; Q_1 = 4.3; Q_3 = 4.9) (Table 5).

Team members' professionalism was associated with employment (p = 0.022). When having temporary employment (Md = 5.3; Q_1 = 4.4; Q_3 = 5.4), the experience of team members' professionalism was stronger than when having permanent employment (Md = 4.8; Q_1 = 4.5; Q_3 = 5.1) (Table 4). Also, engagement in the workplace (p = 0.019) and perceived work empowerment (p = 0.022) stand out in the results. When the experience of engagement in the workplace was good, the experience of team members' professionalism was higher (Md = 5.1; Q_1 = 4.6; Q_3 = 5.3). When having a weak level of perceived work empowerment (Md = 5.0; Q_1 = 4.7; Q_3 = 5.2), the experience of team members'

Table 5 Teamwork factors experienced by respondents (n = 96) (Part 1)

Variables	Team membership				Team functionality			
	Md	Q_1	Q_3	p-value	Md	Q_1	Q_3	p-value
Working experience in healthcare				0.331				0.007
≤ 9 (1)	5.33	4.98	5.96		5.43	5.14	5.71	
10–19 (2)	5.46	5.10	6.00		5.86	5.43	6.14	2 > 3; p = 0.016[a]
≥ 20 (3)	5.33	4.33	5.67		5.43	5.00	5.75	
Working experience as perioperative nurse				0.730				0.007
≤ 9 (1)	5.33	5.08	5.65		5.57	5.14	5.82	
10–14 (2)	5.50	4.88	6.08		5.93	5.43	6.21	2 > 1; p = 0.046[a]
≥ 15 (3)	5.33	4.50	5.75		5.43	5.00	5.71	2 > 3; p = 0.008[a]
Working experience in current OR				0.095				0.035
≤ 4 (1)	5.42	5.25	6.08		5.57	5.14	5.86	
5–9 (2)	5.17	4.65	5.54		5.71	5.57	6.14	2 > 3; p = 0.033[a]
≥ 10 (3)	5.42	4.42	6.00		5.43	4.89	5.86	
Working time				0.312				0.066
full-time	5.33	5.00	5.88		5.57	5.14	5.86	
part-time	4.96	4.23	5.81		6.14	5.50	6.50	
Working shift				0.358				0.001
day shift (1)	5.42	5.17	5.67		5.36	4.86	5.71	
two shift (2)	5.92	5.00	6.17		5.57	5.43	6.00	
three shift (3)	5.25	4.58	5.75		5.71	5.54	6.14	3 > 1; p = 0.001[a]
Engagement in the workplace				0.003				0.433
poor	5.25	4.79	5.42		5.57	5.14	5.86	
good	5.58	5.33	6.08		5.71	5.29	6.00	
Perceived work empowerment				0.004				0.163
weak	5.25	4.33	5.60		5.57	5.00	5.86	
strong	5.42	5.25	6.17		5.71	5.29	6.04	

Table 5 Teamwork factors experienced by respondents (n = 96) (Part 2)

Variables	Team cohesion				Team members' professionalism			
	Md	Q₁	Q₃	p-value	Md	Q₁	Q₃	p-value
Working experience in healthcare				0.244				0.377
≤ 9 (1)	4.75	4.50	5.38		4.68	4.41	5.18	
10–19 (2)	4.75	4.25	4.94		4.86	4.57	5.07	
≥ 20 (3)	5.00	4.25	5.75		5.07	4.64	5.21	
Working experience as perioperative nurse				0.842				0.455
≤ 9 (1)	4.75	4.50	5.44		4.71	4.43	5.11	
10–14 (2)	4.75	4.25	5.19		4.86	4.41	5.13	
≥ 15 (3)	4.88	4.25	5.50		5.00	4.61	5.21	
Working experience in current OR				0.377				0.479
≤ 4 (1)	4.75	4.50	5.44		4.93	4.50	5.25	
5–9 (2)	4.63	4.25	5.06		4.79	4.20	5.07	
≥ 10 (3)	5.00	4.25	5.50		4.86	4.43	5.21	
Working time				0.852				0.539
full-time	4.75	4.50	5.50		4.86	4.50	5.20	
part-time	5.00	4.25	-		5.00	4.57	5.29	
Working shift				0.002				0.113
day shift (1)	5.00	4.50	5.50	1 > 3; p = 0.040[a]	4.93	4.64	5.21	
two shift (2)	5.00	4.75	6.00	2 > 3; p = 0.002[a]	5.00	4.79	5.20	
three shift (3)	4.50	4.25	4.75		4.68	4.21	5.07	
Engagement in the workplace				0.003				0.019
poor	4.75	4.25	4.88		4.79	4.36	5.00	
good	5.00	4.50	5.63		5.07	4.64	5.25	
Perceived work empowerment				0.616				0.022
weak	4.75	4.25	4.88		5.04	4.71	5.21	
strong	5.00	4.50	5.63		4.71	4.36	5.07	

Higher scores represent a higher level of agreement with teamwork sub-dimensions; [a]Median test, pairwise comparisons (Bonferroni); Md – median; SD – standard deviation; Q₁ – lower quartile; Q₃ – upper quartile

professionalism was stronger than when having a strong level of perceived work empowerment (Md = 4.7; Q₁ = 4.4; Q₃ = 5.1) (Table 5).

Discussion

The results of this study indicate that nurses' OR roles impact their experience of team membership and team cohesion. This study confirms previous findings of the differences between the roles of perioperative nurses (Eskola et al., 2016; Sonoda et al., 2018). Scrub nurses valued team membership and team cohesion more highly than nurse anaesthetists. Experienced differences in team membership and team cohesion between nurse anaesthetists and scrub nurses may indicate that they have sub-teams instead of a common perioperative nurse team. In Finland, the perioperative nurses' scope of work varies, where nurse anaesthetists work in a highly independent way and scrub nurses cooperate and orient with surgeons. However, although nurse anaesthetists may prefer autonomy in their work (Kirschbaum et al., 2018), it is possible they can also feel isolation.

Sub-teams can enable individuals to work cohesively together under pressure. But discontinuity among nursing staff can limit their opportunities to meet and form common knowledge and procedures (Gillespie et al., 2009), thus hampering cooperation between different sub-teams. Particularly, discontinuity and a shortage of nursing staff is recognised as a problem which organisations worldwide are urgently seeking to address (Goodare, 2017).

This study reveals that three-shift working enhances the experience of team functionality but hinders the experience of team cohesion. In three-shift work, it is not always possible to work with the same team, and team familiarity is subsequently weakened. Although turnover and the delimitation of individual roles can impair intra- and inter-team communication, it can also simultaneously contribute to team performance (Gillespie et al., 2009). Accordingly, team familiarity has been seen to predict the non-technical skill performance of scrub nurses (Kang et al., 2015) and also have an impact on the OR team procedure time (He et al., 2014).

In the results, working experience in healthcare and as a perioperative nurse had a strong association with the experience of team functionality. Most of the nurses had worked in their current OR for over five years. Also, they had healthcare and OR working

experience lasting over 10 years. It is further noticeable that in this study, nurses evaluated their working ability and coping at work quite highly. Accordingly, working together over a longer period of time can help team members to develop a common understanding of coordinated and fluent procedures in the OR (Gillespie et al., 2013).

Engagement in the workplace was associated with the experience of team membership, team cohesion, and team members' professionalism. Just over half of the nurses valued variability, challenge, meaningfullness, and joy of work. However, nurses experienced their rewards of work and work appreciation as poor. Previously it has been shown that perceived distributive justice influences mental distress and may lead one to underestimate one's personal value and work (Pellerin & Cloutier, 2018). Perceived work empowerment was associated with the experience of team membership and moderately with team members' professionalism. Thus, empowered OR nurses are a central aspect of the overall OR team, helping to refine earlier research that has reported OR nurses as core personnel even if they change teams, who can also take formal and informal leadership roles (Sykes et al., 2015) and thus support the whole team.

The results show that temporary employment had a stronger association with team members' self-evaluated professionalism. In its entirety, professional collegial teamwork has been seen to enhance patient safety (Sandelin et al., 2019). Therefore, it would be pertinent to explore the relationship between employment status and professionalism further, and to expand on notions that it is team members' technical competence that supports teamwork overall (Aveling et al., 2018).

Limitation of study

Some limitations in the present study are acknowledged. Particularly, this study only includes nurses from one hospital district in Finland, the sample size was moderate, and the respond rate was low, which limits the generalization of the results to wider contexts. The possible reason for the low response rate was that the OR is a very active work environment and the nurses answered the survey alongside their work. Duration of data collection was continued by permission of organizations because of the low response rate. In addition, the Teamwork Scale used was specifically developed for this study, thus the theoretical structure of the Teamwork Scale is based on the results of a literature review. The internal consistency of the summated variables of the new instrument was found to be acceptable (Cronbach's alpha value > 0.60) (Gray et al., 2017).

Three of the alpha values of the Teamwork Scale were found to be acceptable, with the exception of one value (team cohesion) which had a Cronbach's alpha value lower than 0.60. The reason for the low value of this sub-dimension may be related to the small number of items it contained (Tavakol & Dennick, 2011), and it might need more items to be added to improve its value. In the future, it would be advisable to test the used Teamwork Scale with a larger sample to obtain further and comparable data.

Conclusion

This study has explored perioperative nurses' experiences of teamwork. Perioperative nurses experienced teamwork positively, which offers a good foundation from which to face the future challenges of teamwork in perioperative care. Notably, perioperative nurses' professional roles (scrub nurse or nurse anaesthetist) and their working shift had several connections to teamwork. The role in which the nurse works has different issues that need to be supported by the manager. Furthermore, three-shift working can be seen to hinder the experience of team cohesion, and this should be taken into careful consideration by OR managers in their daily work. Overall, despite positive results, the findings would be helped by conducting more research in this area with bigger samples and also in other countries.

Ethical aspects and conflict of interest

Research permissions were obtained from each organization. The study was conducted in accordance with the guidelines of the WMA Declaration of Helsinki (World Medical Association 2018). Participation was voluntary and anonymity was assured. Completing the questionnaire via the internet was assumed as consent to participate. All authors have no conflict of interest to report.

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Author contributions

Concept and design (SE, TS), data analysis and interpretation (MU, MR), manuscript processing (MU, SE, TS, MR), critical revision of manuscript (TS, MR), final completion of the article (MU, TS, MR).

References

Aveling, E. L., Stone, J., Sundt, T., Wright, C., Gino, F., & Singer, S. (2018). Factors influencing team behaviors in surgery: a qualitative study to inform teamwork interventions. *The Annals of Thoracic Surgery*, *106*(1), 115–120. https://doi.org/10.1016/j.athoracsur.2017.12.045

Bezemer, J., Korkiakangas, T., Weldon, S. M., Kress, G., & Kneebone, R. (2016). Unsettled teamwork: communication and learning in the operating theatres of an urban hospital. *Journal of Advanced Nursing*, *72*(2), 361–372. https://doi.org/10.1111/jan.12835

Bogdanovic, J., Perry, J., Guggenheim, M., & Manser, T. (2015). Adaptive coordination in surgical teams: an interview study. *BMC Health Services Research*, *15*, 128. https://doi.org/10.1186/s12913-015-0792-5

Brunges, M. & Foley-Brinza, C. (2014). Projects for increasing job satisfaction and creating a healthy work environment. *AORN Journal*, *100*(6), 670–681. https://doi.org/10.1016/j.aorn.2014.01.029

Buttigieg, S. C., West, M. A., & Dawson, J. F. (2011). Well-structured teams and the buffering of hospital employees from stress. *Health Services Management Research*, *24*(4), 203–212. https://doi.org/10.1258/hsmr.2011.011013

Casey-Campbell, M., & Martens, M. L. (2009). Sticking it all together: a critical assessment of the group cohesion-performance literature. *International Journal of Management Reviews*, *11*(2), 223–246. https://doi.org/10.1111/j.1468-2370.2008.00239.x

Catchpole, K. (2010). Errors in the operating theatre - how to spot and stop them. *Journal of Health Services Research & Policy*, *15*(Suppl 1), 48–51. https://doi.org/10.1258/jhsrp.2009.09s105

Cumin, D., Skilton, C., & Weller, J. (2017). Information transfer in multidisciplinary operating room teams: a simulation-based observational study. *BMJ Quality & Safety*, *26*(3), 209–216. https://doi.org/10.1136/bmjqs-2015-005130

Eldor, L., & Vigoda-Gadot, E. (2017). The nature of employee engagement: rethinking the employee-organization relationship. *The International Journal of Human Resource Management*, *28*(3), 526–552. https://doi.org/10.1080/09585192.2016.1180312

Eskola, S., Roos, M., McCormack, B., Slater, P., Hahtela, N., & Suominen, T. (2016). Workplace culture among operating room nurses. *Journal of Nursing Management*, *24*(6), 725–734. https://doi.org/10.1111/jonm.12376

Fasoi, G., Bourazani, M., & Kelesi, M. (2019). Non-technical skills for nurse-anesthetists: learning and evaluation. *World Journal of Pharmaceutical and Medical Research*, *5*(9), 1–8.

Gillespie, B. M., Chaboyer, W., Longbottom, P., & Wallis, M. (2010). The impact of organisational and individual factors on team communication in surgery: a qualitative study. *International Journal of Nursing Studies*, *47*(6), 732–741. https://doi.org/10.1016/j.ijnurstu.2009.11.001

Gillespie, B. M., Chaboyer, W., Wallis, M., Chang, H. Y. A., & Werder, H. (2009). Operating theatre nurses' perceptions of competence: a focus group study. *Journal of Advanced Nursing*, *65*(5), 1019–1028. https://doi.org/10.1111/j.1365-2648.2008.04955.x

Gillespie, B. M., Gwinner, K., Chaboyer, W., & Fairweather, N. (2013). Team communications in surgery: creating a culture of safety. *Journal of Interprofessional Care*, *27*(5), 387–393. https://doi.org/10.3109/13561820.2013.784243

Goodare, P. (2017). Literature review: Why do we continue to lose our nurses? *Australian Journal of Advanced Nursing*, *34*(4), 50–56.

Gray, J. R., Grove, S. K., & Sutherland, S. (2017). *Burns and grove's the practice of nursing research: appraisal, synthesis, and generation of evidence*. Elsevier.

Gregory, M. E., Hughes, A. M., Benishek, L. E., Sonesh, S. C., Lazzara, E. H., Woodard, L. D., & Salas, E. (2021). Toward the development of the perfect medical team: critical components for adaptation. *Journal of Patient Safety*, *17*(2), 47–70. https://doi.org/10.1097/pts.0000000000000598

He, W., Ni, S., Chen, G., Jiang, X., & Zheng, B. (2014). The composition of surgical teams in the operating room and its impact on surgical team performance in China. *Surgical Endoscopy*, *28*, 1473–1478. https://doi.org/10.1007/s00464-013-3318-4

Huq, R. (2015). *The psychology of employee empowerment: concepts, critical themes and a framework for implementation*. Routledge.

Kang, E., Massey, D., & Gillespie, B. M. (2015). Factors that influence the non-technical skills performance of scrub nurses: a prospective study. *Journal of Advanced Nursing*, *71*(12), 2846–2857. https://doi.org/10.1111/jan.12743

Katzenbach, J. R., & Smith, D. K. (2005). *The wisdom of teams: Creating the high-performance organization*. McGraw-Hill.

Kennedy, E., Lingard, L., Watling, C. J., Hernandez Alejandro, R., Parsons Leigh, J., & Cristancho, S. M. (2020). Understanding helping behaviors in an interprofessional surgical team: How do members engage? *The American Journal of Surgery*, *219*(2), 372–378. https://doi.org/10.1016/j.amjsurg.2019.12.014

Kirschbaum, K., McAuliffe, M. S., & Swanson, M. (2018). Team communication in the operating room: a measure of latent factors from a national sample of nurse anesthetists. *AANA Journal*, *86*(1), 11–18.

Kurmann, A., Keller, S., Tschan-Semmer, F., Seelandt, J., Semmer, N. K., Candinas, D., & Beldi, G. (2014). Impact of team familiarity in the operating room on surgical complications. *World Journal of Surgery*, *38*(12), 3047–3052. https://doi.org/10.1007/s00268-014-2680-2

McClurg, C. E., Chen, J. L., Petruzzelli. A., & Thayer, A. L. (2017). Chalenges and new directions in examing team cohesion over time. In E. Salas, W. B. Vessey, & L. B. London (Eds.), *Team dynamics over time* (18th ed., pp. 261–286). Emerald Publishing Limited. https://doi.org/10.1108/S1534-085620160000018011

McGarry, J. R., Pope, C., & Green, S. M. (2018). Perioperative nursing: maintaining momentum and staying safe. *Journal of Research in Nursing*, *23*(8), 727–739. https://doi.org/10.1177/1744987118808835

Merriam-Webster. (n.d.). *Functionality*. Retrieved November, 28, 2020 from https://www.merriam-webster.com/dictionary/functionality

Nakarada-Kordic, I., Weller, J. M., Webster, C. S., Cumin, D., Frampton, C., Boyd, M., & Merry, A. F. (2016). Assessing the similarity of mental models of operating room team members and implications for patient safety: a prospective, replicated study. *BMC Medical Education*, *16*, 229. https://doi.org/10.1186/s12909-016-0752-8

Pellerin, S., & Cloutier, J. (2018). The effects of rewards on psychological health in the workplace: underlying

mechanisms. *Canadian Journal of Administrative Sciences*, *35*(3), 361–372. https://doi.org/10.1002/cjas.1456

Rydenfält, C., Odenrick, P., & Larsson, P. A. (2017). Organizing for teamwork in healthcare: an alternative to team training? *Journal of Health Organisation and Management*, *31*(3), 347–362.
https://doi.org/10.1108/JHOM-12-2016-0233

Salas, E. (2012). *Improving patient safety through teamwork and team training*. Oxford University Press.

Salas, E., DiazGranados, D., Weaver, S. J., & King, H. (2008). Does team training work? Principles for health care. *Academic Emergency Medicine*, *15*(11), 1002–1009. https://doi.org/10.1111/j.1553-2712.2008.00254.x

Salas, E., Sims, D. E., & Shawn Burke, C. (2005). Is there a "Big Five" in Teamwork? *Small Group Research*, *36*(5), 555–599. https://doi.org/10.1177/1046496405277134

Sandelin, A., Kalman, S., & Gustafsson, B. Å. (2019). Prerequisites for safe intraoperative nursing care and teamwork-Operating theatre nurses' perspectives: A qualitative interview study. *Journal of Clinical Nursing*, *28*(13–14), 2635–2643. https://doi.org/10.1111/jocn.14850

Sonoda, Y., Onozuka, D., & Hagihara, A. (2018). Factors related to teamwork performance and stress of operating room nurses. *Journal of Nursing Management*, *26*(1), 66–73. https://doi.org/10.1111/jonm.12522

Sudhakar, G. P. (2013). Different dimensions of teams. *Ecoforum Journal*, *2*(2), 29–35.

Summers, J. K., Humphrey S. E. & Ferris G. R. (2012). Team member change, flux in coordination, and performance: Effects of strategic core roles, information transfer, and cognitive ability. *Academy of Management Journal*, *55*(2),

314–338. https://doi.org/10.5465/amj.2010.0175

Sykes, M., Gillespie, B. M., Chaboyer, W., & Kang, E. (2015). Surgical Team Mapping: Implications for Staff Allocation and Coordination. *AORN Journal*, *101*(2), 238–248. https://doi.org/10.1016/j.aorn.2014.03.018

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 2*, 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd

Villafranca, A., Fast, I., & Jacobsohn, E. (2018). Disruptive behavior in the operating room: prevalence, consequences, prevention, and management. *Current Opinion in Anesthesiology*, *31*(3), 366–374.
https://doi.org/10.1097/ACO.0000000000000592

Walker, K., Duff, J., Di Staso, R., Cobbe, K. A., Bailey, K., Pager, P., & Leathwick, S. (2011). Perioperative nursing shines! Magnet designation reflected in staff engagement, empowerment and excellence. *ACORN: The Journal of Perioperative Nursing in Australia*, *24*(3), 34–42.

World Health Organisation. (2009). *WHO guidelines for safe surgery*.https://www.who.int/patientsafety/safesurgery/tools_resources/9789241598552/en/

World Medical Assosiation. (2018). *Declaration of Helsinki - Ethical principles for medical research involving human subjects*. Retrieved November, 28, 2020, from https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/

Xyrichis, A., & Ream, E. (2008). Teamwork: A concept analysis. *Journal of Advanced Nursing*, *61*(2), 232–241. https://doi.org/10.1111/j.1365-2648.2007.04496.x