

ORIGINAL RESEARCH

Efficacy beliefs predict collaborative practice among intensive care unit nurses

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Abstract

Title. Efficacy beliefs predict collaborative practice among intensive care unit nurses.

Aim. This paper is a report of an investigation of whether intensive care nurses' efficacy beliefs predict future collaborative practice, and to test the potential mediating role of team commitment in this relationship.

Background. Recent empirical studies in the field of work and organizational psychology have demonstrated that (professional) efficacy beliefs are reciprocally related to workers' resources and well-being over time, resulting in a positive gain spiral. Moreover, there is ample evidence that workers' affective commitment to their organization or work-team is related to desirable work behaviours such as citizenship behaviour.

Methods. A longitudinal design was applied to questionnaire data from the EURICUS-project. Structural Equation Modelling was used to analyse the data. The sample consisted of 372 nurses working in 29 different European intensive care units. Data were collected in 1997 and 1998. However, our research model deals with fundamental psychosocial processes that are not time-dependent. Moreover, recent empirical literature shows that there is still room for improvement in ICU collaborative practice.

Results. The hypotheses that (i) the relationship between efficacy beliefs and collaborative practice is mediated by team commitment and (ii) efficacy beliefs, team commitment and collaborative practice are reciprocally related were supported, suggesting a potential positive gain spiral of efficacy beliefs.

Conclusion. Healthcare organizations should create working environments that provide intensive care unit nurses with sufficient resources to perform their job well. Further research is needed to design and evaluate interventions for the enhancement of collaborative practice in intensive care units.

Keywords: collaborative practice, efficacy beliefs, intensive care, nurses, questionnaires, team commitment, well-being

Introduction

The need for effective healthcare organizations has become as pressing as the need for medical breakthroughs. According to Ramanujam and Rousseau (2006), the fundamental challenges the healthcare industry faces nowadays are organizational rather than clinical. Due to increasing specialization in the day-to-day work environment of healthcare organizations, care providers from different disciplines have become increasingly interdependent, and effective interdisciplinary communication has become critical for the quality of patient care. However, in most healthcare organizations (e.g. hospitals) the core staff is comprised of professionals whose socialization mainly occurs pre-employment, resulting in a strong professional identification (Garman *et al.* 2006, Hoff *et al.* 2006). Many healthcare organizations, however, attempt little or no socialization of their own workforce in order to promote organizational identification (Meyer *et al.* 1993, in: Ramanujam & Rousseau 2006). Consequently, differences in professional practices and caregiving behaviours may hinder effective interdisciplinary collaboration.

There is a pressing need to change this current state of affairs, as team structures where workers commit to working collaboratively are the basic units of organizing where work is highly interdependent and timeframes are tight (Goodman *et al.* 1987). According to Bailey and Sandy (1999), the team approach in health care entails that team members will have to adopt a more holistic view of the caregiving process rather than being concerned only with issues and problems that arise from their own specialized tasks. The study reported in this paper concerned working together as a healthcare team in a collaborative way, and specifically psychosocial determinants of this so-called collaborative practice between nurses and physicians at intensive care units (ICUs), i.e. efficacy beliefs and team commitment.

Background

Collaborative practice

The concept of '*collaborative practice*' is defined by Weiss and Davis (1985, p. 299) as 'the interactions between nurses and physicians that enable the knowledge and skills of both professionals to synergistically influence the patient care provided'. Whereas interaction refers to open communication, synergy implies working together in solving problems. A more extensive description of collaborative practice is provided by Taylor (1996, p. 69), who defines it as 'the recognition and respect for each participant's unique exper-

tise in health care delivery. Doctors and nurses work together non-hierarchically in contributing to decisions made together about the patients. The relationship is characterized by trust and mutual communication'. In addition to open communication and cooperative problem-solving, this definition also emphasizes mutual recognition for each others' professional expertise. In line with both of the above definitions, we used three core dimensions to assess collaborative practice: open communication, cooperative problem-solving and professional recognition.

Collaborative practice has been found to be of utmost importance especially in ICUs, as it improves the clinical outcome of patient care (Taylor 1996, Baggs *et al.* 1999). This is not surprising, considering the fact that ICU nurses and physicians carry out very complex tasks that require careful tuning. The EURICUS-I study was performed in 12 European countries and explored the relationships between the organization and management of intensive care units and their medical performance (Reis-Miranda *et al.* 1997). This study showed that ICUs where staff are not strictly confined to their own tasks and functions, but may exchange and substitute each other wherever and whenever required, perform better.

According to Stein-Parbury and Liaschenko (2007), the ICU is an appropriate setting for an analysis of collaboration between nurses and physicians, because it is the context considered the prototype of interdependent teamwork in health care. More recently conducted studies among ICU staff also lend support to the focal role of collaborative practice for ICU functioning. For instance, in a study with staff members of 14 ICUs in two different hospitals in the United States of America (USA), Hamric and Blackhall (2007) found that the quality of nurse-physician collaboration was statistically significantly related to care providers' satisfaction with care, moral distress and ICU ethical climate. Manojlovich and DeCicco (2007) surveyed a sample of 866 US ICU nurses, and showed that nurse-physician communication was predictive of nurse-assessed medication errors. In another US study in medical, surgical, and intensive care units, nurse-physician collaboration turned out to be the only direct predictor of patient satisfaction with nursing care (Larrabee *et al.* 2004). Finally, several studies have demonstrated that when adequate collaboration does not occur, this can have negative outcomes for patients and their families (e.g. Levy 2001, Azoulay & Sprung 2004).

Moreover, there is still room for improvement in ICU collaborative practice. Physicians often dismiss and devalue nurses' knowledge, perceive themselves as the primary decision-makers in healthcare, and feel free to change treatment plans without consultation (e.g. Coombs 2003).

Therefore, it is not surprising that, compared to physicians, ICU nurses perceive lower levels of collaboration and are less satisfied with that collaboration (Miller 2001, Thomas *et al.* 2003, Hamric & Blackhall 2007). In a qualitative study with German ICU nurses, Knoll and Lendner (2008) described the culture of ICU-communication as being highly physician-dominated, resulting in a considerable adverse effect on the flow of patient information between nurses and physicians, and in barriers to nurses participating actively with their knowledge and professional competence in the process of decision-making. In a systematic literature review of 22 studies, nurses' lack of involvement in the plan of care and comfort, and disagreement among physicians and other healthcare team members were listed among the main barriers to effective end-of-life care provision in ICUs (Espinosa *et al.* 2008).

Therefore, (more) empirical research on individual and group factors that contribute to good collaborative practice would seem important. Recently, several studies – which will be discussed in more detail below – have provided evidence of the strong motivational potential of two psychosocial factors in the work setting, i.e. efficacy beliefs (as an individual factor or personal resource) and team commitment (as a group factor or social resource). The present study is the first to investigate in what way intensive care unit nurses' efficacy beliefs and team commitment are related to the quality of collaborative practice between nurses and physicians.

Efficacy beliefs

According to Social Cognitive Theory (Bandura 1997, 1999, 2001) people differ in their beliefs about their competences and success in different areas of their life. These 'beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments' are labelled 'self-efficacy' (Bandura 1997, p. 3). There is considerable evidence for the positive effects of self-efficacy on performance and health in different domains such as the workplace, school, and sports (Bandura 1999, 2001). For example, recent research shows that efficacy beliefs are pivotal in coping with stress and in enhancing psychological well-being (e.g. Salanova *et al.* 2002, Llorens *et al.* 2007).

In Conservation of Resources (COR) theory (Hobfoll 1989, 2001), this type of belief is classified under the category of (personal) resources. Resources are defined as 'those objects, personal characteristics, conditions or energies that are valued by the individual or that serve as a means for attainment of these objects, personal characteristics, conditions or energies' (Hobfoll 1989, p. 516). According to Hobfoll (1989), resources have a strong motivational

potential, which is in line with Bandura's (1997) view that efficacy beliefs may act as an important determinant of the effort and persistence that people will invest in pursuing goals, or in other words their level of *motivation* (Katzell & Thompson 1990, Locke & Latham 1990).

Since resources enable the acquisition or preservation of more resources, people are motivated to create and invest resources in order to enrich their resource pool. For instance, workers invest time for the salary that will afford them a reasonable lifestyle and job security (Hobfoll & Freedy 1993). The COR model predicts that when such investments do provide a good return, and consequently goals are achieved, people experience this as a gain that increases the resource pool, and makes it more likely that more resources will subsequently be acquired. Accordingly, workers who gain resources are most likely to gain more resources in the near future, generating a positive 'gain spiral' of resources found in previous empirical studies (e.g. Salanova *et al.* 2005, Llorens *et al.* 2007).

Recent empirical studies (e.g. Salanova *et al.* 2002) have convincingly demonstrated that using a domain-specific measure of efficacy beliefs rather than a general measure yields more robust results because a person's self-efficacy belief is likely to differ depending on the activity to which it is related (Bandura 1997, 1999). Therefore, in the current study, a work-specific measure of efficacy beliefs was used, i.e. the concept of 'perceived professional efficacy' derived from the literature on burnout (Maslach & Jackson 1981, Schaufeli *et al.* 1996). Several scholars actually consider burnout as a 'crisis in professional efficacy' (Cherniss 1980, Leiter 1992).

For ICU nurses, there is much to be gained in changing a more traditional, hierarchical working relationship with physicians into egalitarian collaborative practice. Therefore, following Bandura's (1997) view of the motivational potential of efficacy beliefs, a higher level of ICU nurses' professional efficacy will probably go together with more effort (and persistence) in pursuing the highly valued goal of collaborative practice. In the present study, we expect the relationship between nurses' efficacy beliefs and collaborative practice to be positive.

Team commitment

Commitment in the workplace can take various forms and different foci, amongst others organizational commitment that can be defined as a psychological state that binds the individual to the organization (Allen & Meyer 1990). In a meta-analysis of the antecedents, correlates and consequences of the three subdimensions of organizational commitment,

Meyer *et al.* (2002) showed that affective commitment has the strongest positive correlation with desirable work behaviours (i.e. attendance, job performance and organizational citizenship behaviour). Affective commitment is defined as 'the individual's emotional attachment to, identification with, and involvement in the organization' (Meyer & Allen 1991, p. 67), and is governed by free choice, whereas this is not, or to a lesser extent, the case for continuance and normative commitment. Individuals with a strong affective commitment continue employment with the organization because they *want* to do so' (Meyer & Allen 1991, p. 67), whereas those with a strong continuance or normative commitment continue employment because they feel they *should* do so. Therefore, it is not surprising that affective commitment especially is strongly related to positive outcomes.

Team commitment is the psychological attachment that members feel towards their (work) team and this is analogous to organizational commitment, except that the target of the attachment is the team rather than the larger organization. In a study by Pierce and Herbig (2004), it was found that team commitment had a large effect on team citizenship behaviour. The more committed members were to their team, the more they engaged in behaviours that were beneficial to their team. Based on this, we expect to find a positive relationship between team commitment and collaborative practice in the present study. Moreover, in the EURICUS-I study (Reis-Miranda *et al.* 1997), ICU nurses' level of affective commitment to their work team, i.e. the strength of their identification with and involvement in the ICU, was one of the factors that was most strongly related to the medical performance of ICUs. The higher the level of nurses' affective commitment to their work-team, the better their ICU's clinical outcome (in terms of Standardized Mortality Ratios) was. It could be speculated that team commitment affects medical performance through its (positive) effect on the quality of collaboration within the ICU team.

Interestingly, in their recent meta-analysis Meyer *et al.* (2002) also found two individual difference variables to be statistically significantly correlated with affective commitment, i.e. external locus of control and task efficacy. The latter concept is comparable to professional efficacy. Apparently, the motivational potential of efficacy beliefs may also extend to the context in which tasks are performed. This is confirmed by a recent study among teams of MBA students participating in a negotiation simulation; this showed that efficacy beliefs are predictive of commitment, in terms of team members' intent to remain in the team (Bayazit & Mannix 2003). In line with these findings, it may be speculated for the present study that the higher the level of

ICU nurses' professional efficacy, the more committed they will be to their ICU work-team.

In the previous section, we postulated a positive relationship between ICU nurses' efficacy beliefs and collaborative practice. A logical next question is whether or not these concepts are directly related to one another. Based on the above, we expect that the relationship between ICU nurses' (professional) efficacy beliefs and collaborative practice is mediated by team commitment, in the sense of affective commitment.

Reciprocal causation

In the preceding paragraphs we explained that, according to Bandura's Social Cognitive Theory, efficacy beliefs may act as powerful predictors (or antecedents) of well-being (such as team commitment) and organizational behaviour (such as collaborative practice). However, the recent literature also provides empirical examples of reversed causal relationships between resources such as efficacy beliefs and mental health or well-being (e.g. Schwarzer *et al.* 1993), and even of reciprocal causation. For example, in a two-wave longitudinal study with teachers, Llorens *et al.* (2005) found that poor efficacy beliefs led to exhaustion and cynicism – the core of burnout – and *vice versa*. This is not surprising, as people also rely on their affective states to judge their capabilities (see e.g. Salanova *et al.* 2001). From a Positive Psychology perspective, in another two-wave study with teachers, Llorens *et al.* (2003) found that job resources (i.e. easy access to information and relevant materials) increased work engagement and future efficacy beliefs, whereas in the reversed direction engagement and efficacy beliefs increased the availability of resources. Llorens *et al.* (2007) carried out a two-wave study among Spanish university students who had to perform two group problem-solving tasks by means of computers in a laboratory setting. Their results showed the existence of a positive 'gain spiral'. Efficacy beliefs played a mediating role between task resources and engagement. Moreover, engagement increased efficacy beliefs, which in turn increased task resources over time. Finally, in a two-wave study with teachers, Salanova *et al.* (2006) found that efficacy beliefs had a reciprocal effect on social resources (i.e. organizational social climate) and well-being (i.e. flow). The latter studies point to the existence of a potential positive 'gain spiral' in which efficacy beliefs play an important role.

Thus, it should be noted that even though Social Cognitive Theory emphasizes the strong predicting role of efficacy beliefs, their relationships with other psychosocial constructs and behaviour should be considered reciprocal in nature. In

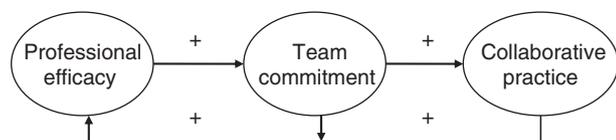


Figure 1 Hypothesized model.

the longitudinal study reported here, we focused on the causal (reciprocal) relationships between efficacy beliefs, team commitment and collaborative practice in a sample of ICU nurses. Novelties of the study were that efficacy beliefs played a predicting role in the model, and that not only work-related well-being (i.e. team commitment) but also work behaviour (i.e. collaborative practice) were included. Our research model is shown in Figure 1.

The study

Aim

The aim of the study was to investigate whether ICU nurses' efficacy beliefs predict future collaborative practice, and to test the potential mediating role of team commitment in this relationship.

The following hypotheses were formulated:

Hypothesis 1: Team commitment mediates the relationship between ICU nurses' (professional) efficacy beliefs on the one hand and collaborative practice on the other hand.

Hypothesis 2: Efficacy beliefs, team commitment, and collaborative practice are reciprocally related. In addition to the relationship of efficacy beliefs with collaborative practice via team commitment, it is hypothesized that team commitment leads to stronger efficacy beliefs (*Hypothesis 2a*), and that collaborative practice leads to more team commitment (*Hypothesis 2b*).

Design

A longitudinal questionnaire survey design was adopted.

Participants

The EURICUS-project (European ICU Studies), consisting of three complementary studies, was designed to study ICUs as an healthcare sub-system (see Reis-Miranda *et al.* 2007 for an overview). A convenience sample of ICU nurses was recruited via the personal network of the project leader. For the present study, data from 429 ICU nurses from eight different European countries were used. On two occasions, respondents completed an extensive questionnaire on collaborative

practice and work-related well-being (with a time interval of 15 months in between). The questionnaire was translated from English to the language of the different participating countries, and then back-translated to English by bi-lingual researchers and experts in the field of intensive care nursing. Questionnaires with missing values on any of the study variables were removed from the dataset, leaving data from 372 nurses that could be used to test our research model. There were no statistically significant differences between the study sample and the nurses who were removed from the dataset as regards gender distribution (χ^2 , d.f. = 1, 3.89, $P > 0.05$), mean age ($t = -0.06$; $P > 0.10$) or mean tenure ($t = -0.17$; $P > 0.10$), indicating that dropout was not selective.

Measures

Efficacy beliefs were measured with the respective subscale of the Maslach Burnout Inventory-HSS (Maslach *et al.* 1996), consisting of seven items. A sample item is 'I can effectively solve the problems that arise in my work'. All items are scored on a seven-point Likert scale (1 = never, 7 = every day).

Team commitment was assessed by means of three scales, which are based on the Shortell ICU Nurse-Physician Questionnaire (Shortell *et al.* 1991) and are related to the aspects of affective commitment as defined by Meyer and Allen (1991, p. 67)). The first two scales, consisting of two items each, were related to identification with the ICU (e.g. 'I identify with the goals and objectives of this ICU') and involvement in the ICU (e.g. 'I feel I'm a part of this ICU'). The third scale, consisting of three items, dealt with the individual's emotional attachment to the ICU (e.g. 'If I had the chance to do the same kind of work for the same pay in another unit of the hospital, I wouldn't go'). All items were scored on a 5-point Likert-scale (1 = strongly disagree, 5 = strongly agree).

Collaborative practice was assessed by means of three scales: open communication, cooperative problem-solving and professional recognition. Open communication was measured by five items (e.g. 'Communication between nurses and physicians in this ICU is very open'), and cooperative problem-solving was measured by four items (e.g. 'Nurses and physicians all contribute from their experience and expertise to produce a high quality solution for work-related problems') from the Shortell ICU Nurse-Physician Questionnaire (Shortell *et al.* 1991), scored on 5-point Likert Scales (1 = not at all likely, 5 = almost certainly). Professional recognition was measured by six items (e.g. 'Concerning the success of patient care, physi-

cians understand that the work of nurses is as important as their own work') from the Collaborative Practice Scale (Weiss & Davis 1985), scored on a 5-point Likert Scale (1 = never, 5 = always).

Data collection

Data were collected over an 15-month period in 1997–1998. However, they can still be considered of contemporary relevance, according to the papers cited in the Introduction above. The delay between the data collection and the reporting of this study can be explained by the fact that our research model is based on the results of very recent empirical studies from the field of Work and Organizational Psychology. Moreover, our research model cannot be considered dated either as it deals with fundamental psychosocial processes, i.e. it is made up of relationships between psychosocial constructs which are not time-dependent.

Ethical considerations

The study was approved by the ethics committees of the participating hospitals.

Data analysis

Before performing the analyses described below, we checked all variables for normality (i.e. skewness and kurtosis), and no violations of the assumption of normality was found. Means, standard deviations, Cronbach's alpha coefficients and bivariate correlations were computed for all scales used. Next, a measurement model including all scales was tested on Time 1 (T1) data by means of confirmatory factor analysis (CFA) implemented by the AMOS software program (Arbuckle 1997). Finally, Structural Equation Modelling (SEM) using the AMOS program was conducted to establish the relationships between the model variables. As our sample included ICU nurses from different European countries, we controlled for country in the subsequent analyses. First, the *Stability Model* (Model 1; M1) was tested without cross-lagged structural paths but with temporal stabilities and synchronous correlations. Temporal stabilities were specified as correlations between the corresponding constructs at Time 1 (T1) and Time 2 (T2). Model 1 estimates the total stability coefficient between T1 and T2 without specifying the variance in direct or indirect paths (Pitts *et al.* 1996). Second, the fit of the stability model was compared to that of three more complex models: (i) the *Causality Model* (Model 2; M2), which is identical to M1 but includes additional cross-lagged structural paths from

T1 efficacy beliefs to T2 team commitment and to T2 collaborative practice, as well as from T1 team commitment to T2 collaborative practice; (ii) the *Reversed Causation Model* (Model 3; M3), which is also identical to M1, but includes additional cross-lagged structural paths from T1 collaborative practice to T2 team commitment and T2 efficacy beliefs, as well as from T1 team commitment to T2 efficacy beliefs; and (iii) the *Reciprocal Model* (M4), which includes reciprocal relationships between efficacy beliefs, team commitment, and collaborative practice and thus includes all paths of M2 and M3. In addition, the measurement errors of the corresponding observed variables collected at different time points were allowed to co-vary over time (e.g. a covariance is specified between the measurement error of open communication at T1 and the measurement error of open communication at T2). While generally in cross-sectional models measurement errors should not be allowed to co-vary, in longitudinal measurement models the errors of measurement corresponding to the same indicator *should be* allowed to co-vary over time (Pitts *et al.* 1996, McArdle & Bell 2000) in order to account for the systematic (method) variance that is associated with each specific indicator.

Maximum likelihood estimation methods were used and the input for each analysis was the covariance matrix of the items. The goodness-of-fit of the different models was evaluated using the following absolute goodness-of-fit indices: (i) the χ^2 goodness-of-fit statistic, (ii) the Root Mean Square Error of Approximation (RMSEA), (iii) the Goodness-of-Fit Index (GFI) and (iv) the Adjusted Goodness-of-Fit Index (AGFI). Moreover, three relative Goodness-of-Fit Indices were calculated: (i) the Normed Fit Index (NFI), (ii) the Comparative Fit Index (CFI) and (iii) the Incremental Fit Index (IFI). Thus, by using different types of fit indices, we were also able to compare models to one another in order to determine which fitted our data best. Values smaller than 0.08 for the RMSEA are indicative of an acceptable fit, and values greater than 0.10 should lead to model rejection (Cudeck & Browne 1993). For all other fit indices, i.e. GFI, AGFI, NFI, CFI and IFI values >0.95 are considered as indicating a good fit (Hu & Bentler 1999, Yu 2002).

Results

The sample of nurses included 315 women (84%) and 57 men (16%), working in 29 different intensive care units. Their mean age was 34.71 years (SD = 7.18) and their mean tenure in the present ICU was 6.24 years (SD = 4.61; Median = 5.17; range = 0.5–25.8 years.).

Means, standard deviations, internal consistencies (Cronbach's α) and intercorrelations of all study variables are reported in Table 1. All alpha values meet the criterion of 0.70 (Nunnally & Bernstein 1994). Closer inspection of Table 1 reveals that efficacy beliefs are statistically significantly positively related to the aspects of team commitment (attachment, identification, and involvement), and to the aspects of collaborative practice (open communication, cooperative problem solving and professional recognition) at both T1 and T2. In the same way, the aspects of team commitment are positively correlated with the aspects of collaborative practice at both measurements.

Confirmatory factor analysis

The results of the CFA on Time 1 data show that our measurement model fits the data. At T1, all manifest variables loaded statistically significantly on the intended latent factors, with factor loadings varying between 0.49 and 0.85. Even though the Chi-square value of the three-factor model is statistically significant ($\chi^2 = 41.41$, d.f. = 12, $P < 0.001$), the relative fit indices were all meeting the criteria for a good fit: RMSEA = 0.08; GFI = 0.97; AGFI = 0.93; NFI = 0.96; CFI = 0.97; IFI = 0.97. Based on these results, professional efficacy was used as the only indicator of the latent construct 'efficacy beliefs'. Involvement; identification and emotional attachment were used as indicators of the latent construct 'team commitment'. Finally, open communication, cooperative problem solving and professional recognition were used as indicators of the latent construct 'collaborative practice'.

Testing the reciprocal model

As can be seen from Table 2, the model fit of the *Causality Model* (M2) is superior to that of the *Stability Model* (M1) [$\Delta\chi^2(3) = 56.18$, $P < 0.001$]. This suggests the relevance of cross-lagged paths from T1 efficacy beliefs to T2 team commitment and T2 collaborative practice, as well as from T1 team commitment to T2 collaborative practice. Furthermore, the *Reversed Causality Model* (M3) also fitted the data statistically significantly better than the *Stability Model* (M1) [$\Delta\chi^2(3) = 60.76$, $P < 0.001$]. This indicates that the model with the cross-lagged paths from T1 team commitment to T2 efficacy beliefs, and from T1 collaborative practice to T2 team commitment and T2 efficacy beliefs, also shows a better fit to the data than the model including only temporal stabilities and synchronous correlations (i.e. M1). Finally, it appeared that the *Reciprocal Model* (M4) with the addition of reciprocal effects was superior to the *Stability Model*

Table 1 Means, standard deviations, correlations, and internal consistencies (Cronbach's alpha; on the diagonal) of the study variables ($n = 372$)

	Mean	SD	F	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Efficacy beliefs T1	5.48	0.97		0.72													
2. Efficacy beliefs T2	5.29	0.93		0.49**	0.73												
3. Involvement T1	3.78	0.74		0.34**	0.24**	0.79											
4. Involvement T2	3.72	0.70		0.21**	0.32**	0.53**	0.82										
5. Identification T1	3.74	0.79		0.37**	0.27**	0.54**	0.40**	0.71									
6. Identification T2	3.72	0.81		0.27**	0.39**	0.35**	0.58**	0.49**	0.70								
7. Attachment T1	3.96	0.86		0.19**	0.08	0.38**	0.27**	0.41**	0.29**	0.81							
8. Attachment T2	3.82	0.91		0.12*	0.17**	0.18**	0.39**	0.21**	0.65**	0.44**	0.83						
9. Open communication T1	3.44	0.73		0.18**	0.16**	0.41**	0.34**	0.43**	0.34**	0.26**	0.18**	0.84					
10. Open communication T2	3.44	0.76		0.18**	0.26**	0.30**	0.45**	0.27**	0.42**	0.18**	0.19**	0.64**	0.90				
11. Cooperative problem-solving T1	3.28	0.78		0.31**	0.19**	0.46**	0.34**	0.39**	0.30**	0.24**	0.11*	0.67**	0.51**	0.76			
12. Cooperative problem-solving T2	3.30	0.75		0.19*	0.26**	0.32**	0.50**	0.22**	0.40**	0.15**	0.16**	0.42**	0.64**	0.51**	0.78		
13. Professional recognition T1	3.25	0.76		0.26**	0.23**	0.49**	0.42**	0.52	0.37**	0.23**	0.11*	0.65**	0.54**	0.63**	0.45**	0.83	
14. Professional recognition T2	3.30	0.71		0.24**	0.27**	0.46**	0.46**	0.40**	0.45**	0.25**	0.19**	0.56**	0.73**	0.51**	0.63**	0.72**	0.87

** $P < 0.01$; * $P < 0.05$; Coefficients alpha are reported on the diagonal.

Table 2 Goodness-of-Fit Index for the different models in the structural equation modelling analyses ($n = 372$)

Model	χ^2	d.f.	RMSEA	GFI	AGFI	NFI	CFI	IFI	$\Delta\chi^2$	Δ d.f.
Model 1 Stability	269.72	72	0.09	0.91	0.86	0.90	0.92	0.93		
Model 2 Causality	213.53	69	0.08	0.93	0.88	0.92	0.95	0.95	M2 – M1 = 56.18***	3
Model 3 Reversed	208.954	69	0.07	0.93	0.88	0.92	0.95	0.95	M3 – M1 = 60.76***	3
Model 4 Reciprocal	144.014	66	0.06	0.95	0.91	0.95	0.97	0.97	M4 – M1 = 125.70*** M4 – M2 = 69.52*** M4 – M3 = 64.94***	6 3 3
Model 5 Final	145.179	68	0.05	0.95	0.91	0.95	0.97	0.97	M5 – M4 = 1.17 n.s.	2

χ^2 , chi-square statistic; d.f., degrees of freedom; RMSEA, root mean square error of approximation; GFI, Goodness-of-Fit Index; AGFI, Adjusted Goodness-of-Fit Index; NFI, Normed Fit Index; CFI, Comparative Fit Index; IFI, Incremental Fit Index; n.s., non significant. *** $P < 0.001$.

M1 [$\Delta\chi^2(6) = 125.70, P < 0.001$], the Causality Model M2 [$\Delta\chi^2(3) = 69.52, P < 0.001$], and the Reversed Causality Model M3 [$\Delta\chi^2(3) = 64.94, P < 0.001$]. So, both causal and reversed causal paths are important, as the model with cross-lagged reciprocal relationships between efficacy beliefs, team commitment and collaborative practice (M4) best fits the data.

Hypothesis 1 assumed that team commitment mediates the relationship between efficacy beliefs and collaborative practice. Following Taris and Kompier (2006), a test for mediation in the present two-wave study requires that both the path from T1 efficacy beliefs to T2 team commitment and the path from T1 team commitment to T2 collaborative practice are significant. The model M2 that includes these causal relationships resulted in statistically significant lagged and positive effects of T1 efficacy beliefs on T2 team commitment ($\beta = 0.34, P < 0.001$) as well as of T1 team commitment on T2 collaborative practice ($\beta = 0.25, P < 0.001$). However, the lagged effect of T1 efficacy beliefs on T2 collaborative practice is not statistically significant. Thus, efficacy beliefs are positively related to team commitment, which in turn has a positive impact on collaborative practice. Thus, *Hypothesis 1* is supported by the data of this study: over time, team commitment mediates the relationship between professional efficacy on the one hand and collaborative practice on the other hand.

According to *Hypothesis 2a*, T1 team commitment would have a lagged positive effect on T2 efficacy beliefs. The model M3 that included this path showed a statistically significant reversed causal effect of T1 team commitment on T2 efficacy beliefs ($\beta = 0.26, P < 0.01$). Therefore, our results confirm *Hypothesis 2a*, as levels of team commitment at T1 are statistically significantly, positively related to nurses' efficacy beliefs at T2. In addition, a statistically significant reversed causal effect of T1 collaborative practice on T2 team commitment was found ($\beta = 0.47, P < 0.001$). Thus, *Hypothesis 2b*, stating that T1 collaborative practice would

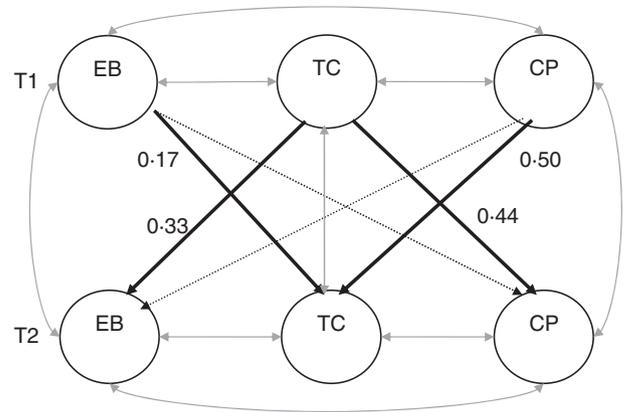


Figure 2 Structural path coefficients of the Final Model ($n = 372$). Note. Solid lines represent standardized coefficients. All path coefficients are statistically significant at $P < 0.01$. Dotted lines indicate non-statistically significant paths. EB, efficacy beliefs; TC, team commitment; CP, collaborative practice.

have a lagged positive effect on T2 team commitment, is also confirmed. Collaborative practice at T1 is statistically significantly, positively related to team commitment at T2. Finally, a non-statistically significant reversed causal effect was obtained of T1 collaborative practice on T2 efficacy beliefs.

Thus, both causal and reversed causal relationships exist simultaneously, which is confirmed by the results of model M4. The *Final Model* (M5), in which non-statistically significant path coefficients of M4 are excluded, is displayed in Figure 2.

To summarize, these findings illustrate that team commitment plays a mediating role in the relationship between efficacy beliefs at T1 and collaborative practice at T2, and in the relationship between collaborative practice at T1 and efficacy beliefs at T2. That is, efficacy beliefs at T1 are statistically significantly positively related to team commitment at T2, whereas in turn team commitment at T1 is statistically significantly positively related to collaborative practice at T2. In addition, collaborative practice at T1 is

What is already known about this topic

- Efficacy beliefs are reciprocally related over time to job resources and to positive work-related well-being.
- Intensive care unit nurses' level of affective commitment to their work team is positively related to intensive care unit medical performance.

What this paper adds

- Affective commitment to the work team is a mediating factor in the reciprocal relationships between intensive care unit nurses' efficacy beliefs and collaborative practice.
- Strengthening intensive care unit nurses' efficacy beliefs will enhance collaborative practice over time
- High quality collaborative practice will also boost intensive care unit nurses' efficacy beliefs.

Implications for practice and/or policy

- Healthcare organizations should create working environments that provide intensive care unit nurses with sufficient resources to perform their job well.
- Further research is needed to design and evaluate interventions for the enhancement of collaborative practice in intensive care units.

statistically significantly positively related to team commitment at T2. Finally, team commitment at T1 is statistically significantly positively related to nurses' efficacy beliefs at T2.

Discussion

In this longitudinal study with ICU nurses we explored the way in which efficacy beliefs, team commitment, and collaborative practice are related to each other over time. The study variables were assessed in two measurement waves with a 15-month time lag. In addition to testing the potential mediating role of team commitment in the relationship between efficacy beliefs and collaborative practice, we specifically looked for reciprocal relationships between the focal variables.

A clear limitation of our study is that data were obtained by means of self-report only and, consequently, the results may be contaminated by common method variance. However, the final model is in line with current theory and with results of previous empirical studies, and is therefore likely to offer a plausible picture of the relationships between the study variables.

First, the results of SEM analyses showed that team commitment indeed mediates the relationship between ICU nurses' professional efficacy and the quality of collaboration between nurses and physicians. Efficacy beliefs had a positive effect on team commitment over time, which in turn had a positive effect on collaborative practice over time. In other words, feeling efficacious leads to (affective) identification with the work group, which in turn fosters the quality of working relationships within the team. The positive relationship between efficacy beliefs (i.e. a resource) and commitment is consistent with the motivation process that is described by the Job Demands-Resources Model (Demerouti *et al.* 2001, Bakker & Demerouti 2007), and with the findings of Meyer *et al.* (2002) and Bayazit and Mannix (2003) that were described in the introduction. In the present study, ICU nurses' commitment to their work team is 'fuelled' by their professional efficacy beliefs. In addition, this study demonstrates that this motivational process also has a long-term, positive effect on desirable work behaviours in terms of good collaboration. Apparently, a strong affective bond with the work team, which can also be considered a social resource, leads ICU nurses to 'invest' in the future quality of working relationships within the team.

Next, our results showed that collaborative practice is also positively related to feelings of professional efficacy over time. However, again, this relationship is not a direct one but it is mediated by team commitment. In other words, high quality working relationships within the team lead to a positive affective state (identification), which in turn boosts personal resources. The positive relationship between team commitment and efficacy beliefs is in line with Fredrickson's (2001) Broaden-and-Build Theory of Positive Emotions. According to this theory, the experience of positive emotions broadens people's momentary thought-action repertoires, which in turn serves to build their enduring personal resources such as efficacy beliefs.

To conclude, our results imply that neither of the constructs included in our research model can be considered as a single cause or consequence; rather, reciprocal causation – i.e. a combination of causation and reversed causation – seems to be operating.

Conclusion

The present study corroborates previous findings on the motivational potential of efficacy beliefs in the work setting. Although efficacy beliefs are usually considered an outcome, our results convincingly demonstrate that they can be considered a cause of psychosocial work processes as well.

Moreover, this study provides clear evidence that efficacy beliefs, team commitment, and collaborative practice have reciprocal relationships over time. In addition, the results point out the key role of team commitment as a mediator between efficacy beliefs and collaborative practice.

Practically speaking, our findings emphasize the importance of creating a work environment that is conducive to ICU nurses' professional efficacy. This can, amongst others, be achieved by providing nurses with sufficient task resources (e.g. job control) to perform their job well, which in turn increase the likelihood of so-called 'success experiences'. These experiences lead people to rely on their own competence, thereby experiencing higher levels of efficacy, and as such they enable the positive processes that are described in this article to start off.

Future studies on (antecedents of) collaborative practice might also use more objective measures of the quality of working relationships (e.g. observations of number or frequency of conflicts between doctors and nurses) or team commitment (e.g. actual turnover rates). Next to individual efficacy beliefs, these studies might include collective efficacy beliefs, e.g. group potency (Guzzo *et al.* 1993). Moreover, in order to be able to demonstrate the existence of so-called gain spirals of efficacy beliefs (Lindsay *et al.* 1995), three-wave panel studies that allow a more rigorous interpretation of causality and reciprocity should be performed (Salanova *et al.* 2010). Finally, it would be interesting to see if our results can be generalized to the functioning of multidisciplinary teams outside the healthcare setting.

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Conflicts of interest

No conflict of interest has been declared by the authors.

Author contributions

PLB, WS, MS and SL were responsible for the study conception and design. PLB, WS and RN performed the data collection. PLB & SL performed the data analysis. PLB, WS, MS, SL and RN were responsible for the drafting of the manuscript. PLB, WS, MS, SL and RN made critical revisions to the paper for important intellectual content. SL and RN provided statistical expertise. RN provided

administrative, technical or material support. PLB supervised the study.

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