Speaking up about patient safety concerns: The influence of safety management approaches and climate on nurses' willingness to speak up

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ABSTRACT

Background: Speaking up is important for patient safety, but healthcare professionals often hesitate to voice their concerns. Direct supervisors have an important role in influencing speaking up. However, good insight into the relationship between managers' behaviour and employees' perceptions about whether speaking up is safe and worthwhile is still lacking.

Aim: To explore the relationships between control- and commitment-based safety management, climate for safety, psychological safety and nurses' willingness to speak up.

Methods: We conducted a cross-sectional survey study, resulting in a sample of 980 nurses and 93 nurse managers working in Dutch clinical hospital wards. To test our hypotheses, hierarchical regression analyses (at ward level) and multilevel regression analyses were conducted.

Results: Significantly positive associations were found between nurses' perceptions of control-based safety management and climate for safety (β=0.74; p<0.001), and between the perceived levels of commitment-based management and team psychological safety (β=0.36; p<0.01). Furthermore, team psychological safety is found to be positively related to nurses' speaking up attitudes (B=0.24; t=2.04; p<0.05). The relationship between nurse-rated commitment-based safety management and nurses' willingness to speak up is fully mediated by team psychological safety.

Conclusion: Results provide initial support that nurses who perceive higher levels of commitment-based safety management feel safer to take interpersonal risks and are more willing to speak up about patient safety concerns. Furthermore, nurses' perceptions of control-based safety management are found to be positively related to a climate for safety; although, no association was found with speaking up. Both control-based and commitment-based management approaches seem to be relevant for managing patient safety, but when it comes to encouraging speaking up a commitment-based safety management approach seems to be most valuable.

INTRODUCTION

Speaking up is important for patient safety. Healthcare professionals who question clinical practices that may compromise patient safety and who raise *"concerns […] upon recognising or becoming aware of the risky or deficient actions of others within health care teams"* (Okuyama, Wagner, & Bijnen, 2014, p. 1) can prevent the occurrence of adverse events, improve team performance and facilitate a learning environment (Kolbe et al., 2012; Morrison, 2014; Okuyama et al., 2014). Despite these potential benefits, prior research showed that healthcare professionals often hesitate to speak up and choose to remain silent (Martinez et al., 2017; Maxfield, Grenny, McMillan, Patterson, & Switzler, 2005; Schwappach & Gehring, 2015).

A key factor influencing whether employees dare to speak up is the behaviour of their direct supervisor (Ashford, Sutcliffe, & Christianson, 2009; Morrison, 2011). Supervisors may, for example, stimulate their staff to voice concerns by actively inviting and appreciating staff input, coaching workers, showing authentic leadership and building trustful relationships with their subordinates (Edmondson, 2003; Morrison, 2014; Morrow, Gustavson, & Jones, 2016; Robbins & McAlearney, 2016; Wong, Spence Laschinger, & Cummings, 2010). So far, only a few studies have empirically tested the relationship between leader behaviour and employee voice (e.g., Detert & Burris, 2007; Edmondson, 2003; Wong et al., 2010). Consequently, *"a clear picture of exactly what it is that leaders do or do not that shapes employees' perceptions"* (Morrison, 2011, p. 391) about whether speaking up is safe and worthwhile is still lacking. The concepts of control- and commitment-based safety management may help to shed light on this.

Control- and commitment-based safety management reflect different aspects of how direct supervisors manage patient safety (Khatri, Baveja, Boren, & Mammo, 2006; Walton, 1985). In a control-based safety management approach, managers stress the importance of following safety rules, monitor compliance and provide employees with feedback. In a commitment-based safety management approach, managers clearly prioritise patient safety by exhibiting role modelling behaviour, they show determination to ensuring safe care delivery, encourage employees to participate in safety improvement initiatives and create awareness on safety issues (Alingh, van Wijngaarden, Paauwe, & Huijsman, 2015). Both management approaches could influence how professionals perceive the risks (psychological safety) and priorities (climate for safety) when it concerns safety behaviour. In the following paragraphs we will outline the hypothesised relationships between the safety management approaches, team psychological safety, climate for safety and employees' willingness to speak up (see Figure 1; in the text below the hypotheses are numbered between brackets).

Team psychological safety is defined as *"a shared belief that the team is safe for interpersonal risk taking"* (Edmondson, 1999, p. 354). A recent meta-analysis showed that employee perceptions of direct supervisor's behaviour play a crucial role in fostering (team)

psychological safety (Frazier, Fainshmidt, Klinger, Pezeshkan, & Vracheva, 2017). Various leadership behaviours were found to be relevant, including being accessible to employees, inviting and appreciating staff contributions and ensuring behavioural integrity (i.e., practise what you preach) (Hirak, Peng, Carmeli, & Schaubroeck, 2012; Leroy et al., 2012; Nembhard & Edmondson, 2006). So, psychological safety seems to be encouraged especially when employees experience supportive leadership (Newman, Donohue, & Eva, 2017), which is in line with a commitment-based safety management approach (hypothesis 1a) (Alingh et al., 2015). In contrast, control-based safety management rather entails a risk of creating a climate of mistrust or even a culture of blame (hypothesis 1b) (Khatri, Halbesleben, Petroski, & Meyer, 2007). Prior research has shown that employee perceptions of the (team) psychological safety are positively related to open communication, speaking up, individual and team learning as well as organisational performance (Edmondson & Lei, 2014; Newman et al., 2017). If leaders create a climate in which their staff feels psychologically safe, the benefits of speaking up in terms of preventing patient harm are more likely to outweigh the costs in terms of potentially negative personal consequences in healthcare professionals' decision whether or not to voice their concerns (hypothesis 3) (Edmondson & Lei, 2014; Morrison, 2011; Newman et al., 2017).

A climate for safety reflects employees' shared "*perceptions of the priority of safety at their unit*" (Zohar, Livne, Tenne-Gazit, Admi, & Donchin, 2007, p. 1312). Leaders are considered to *create* this climate (Zohar, 2010) by showing commitment, aligning their words and deeds, and clearly signalling that delivering safe care is important (hypothesis 2a) (Barling & Hutchinson, 2000; Leroy et al., 2012; McFadden, Stock, & Gowen III, 2015). Employees may also get the message that patient safety is highly valued if their manager emphasises safety rules and procedures (Clarke, 2010) and provides them with feedback on safety compliance (hypothesis 2b) (Alingh et al., 2015). Prior research has shown that a climate for safety is positively related to employees' safety motivation as well as patient safety performances (e.g., reported treatment errors) (Leroy et al., 2012; Neal & Griffin, 2006). In line with this, employees may experience normative pressures to voice safety concerns and consider it more worthwhile to speak up if their direct supervisor demonstrates that patient safety is highly valued (hypothesis 4) (Morrow et al., 2016; Robbins & McAlearney, 2016).

Extending the aforementioned lines of reasoning, team psychological safety and climate for safety might have a mediating role in the relationship between the safety management approaches and employees' speaking up (hypotheses 5a and 5b) (Cafferkey & Dundon, 2015; Edmondson & Lei, 2014; Newman et al., 2017). The current study, first, aims to gain insight into the direct relationships between control- and commitment-based safety management, (team) psychological safety and climate for safety, and between (team) psychological safety, climate for safety and nurses' willingness to speak up about patient safety concerns in clinical hospital wards. Subsequently, we explore the potential mediating role of nurses' perceptions of the team psychological safety and climate for safety.

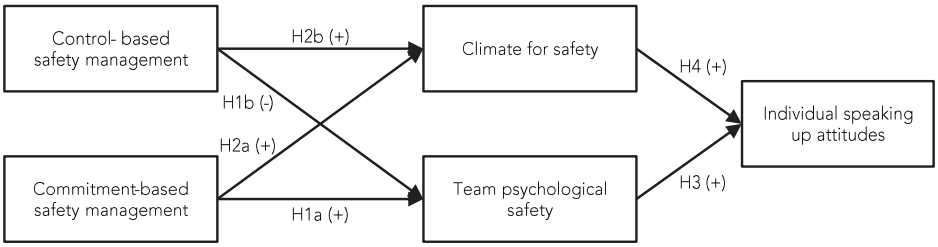

Figure 1 Hypothesised model
Hypothesis 1: (a) Commitment-based safety management is positively, and (b) control-based safety management is negatively related to team psychological safety.
Hypothesis 2: (a) Commitment-based and (b) control-based safety management are positively related to climate for safety.
Hypothesis 3: Team psychological safety is positively related to speaking up.
Hypothesis 4: Climate for safety is positively related to speaking up.
Hypothesis 5: (a) Team psychological safety and (b) climate for safety mediate the relationship between the safety management approaches and speaking up.

METHODS

Study design

We conducted a cross-sectional survey study among nurses and nurse managers working in clinical hospital wards in the Netherlands. Data were collected using two different questionnaires: one for nurses and one for nurse managers (i.e., the direct supervisors of these nurses). The nurse managers answered questions on the 'actual' safety management approaches they put into practice, whereas nurses rated their perceptions of the safety management approaches implemented by the nurse manager by whom they are supervised. The safety management approaches were rated by both groups of respondents in order to explore a potential divergence between manager-ratings and employee-ratings of the management approaches (Den Hartog, Boon, Verburg, & Croon, 2013; Liao, Toya, Lepak, & Hong, 2009) as well as a potential variation in the strength of the associations between the management approaches and nurses' safety-related attitudes and behaviour. According to the literature, employee perceptions of a management approach appear to be stronger predictors of employee behavioural reactions than are manager-ratings of the management practices used in a department (Nishii & Wright, 2007). Furthermore, in order to test the associations between the safety management approaches, climate and speaking up (hypotheses 1–5, see Figure 1), nurses did also answer questions about the departmental climate for safety, psychological safety and their willingness to speak up about patient safety concerns. During the analysis we took into account the hierarchical nature of the data, as the nurses are nested within wards that are managed by a nurse manager.

The Ethics Review Board confirmed that our study was outside the scope of the Netherlands' Medical Research Involving Human Subjects Act and that the rights and privacy of study participants have been taken into account sufficiently (Administration number: EC-2017.62).

Sample

Via hospital associations, all of the 84 Dutch hospitals were invited to participate, resulting in a sample of seven general hospitals, eight top-clinical teaching hospitals and two university medical centres (respectively 15%, 29% and 25% of all hospitals in the Netherlands) (Dutch Hospitals Association, 2015). Between September 2014 and May 2015, all of the nurse managers and nurses working at the 334 clinical wards in these hospitals (i.e., medical wards, surgical wards and intensive care units) were invited to complete a questionnaire. All of the nurses hold a staff position; they provided direct patient care and were not directly involved in managerial tasks within their department. Potential participants received a letter or email to inform them of the study purpose and to ask them to participate anonymously; the correspondence included a link to the online questionnaire. Non-responders received reminders after two and four weeks. No incentives in the form of money or gifts were offered. Passive consent was obtained from all participants as they voluntary agreed to complete the questionnaire and were free to quit at any time during the research.

Measures

Nurse managers rated the safety management approach they put into practice. Nurses answered questions on the perceived safety management approach of their direct supervisor (i.e., the nurse manager of their ward), the climate for safety, psychological safety and their speaking up intentions. Three nurses as well as three nurse managers were interviewed to check the comprehension of items before we determined the content of the final version of the questionnaire.

Control- and commitment-based safety management. Nurses' perceptions of the safety management approaches used by their direct supervisor were measured using the 33-item ConCom Safety Management Scale (Alingh, Strating, van Wijngaarden, Paauwe, & Huijsman, 2018). An example item is: "The actions of my supervisor show that patient safety is a top priority". All items were answered on a 4-point or 5-point Likert scale plus the option 'I don't know'. The item scores were respectively multiplied by five or four to calculate mean scores on a 20-point scale. Higher scores indicate that nurses perceive more control- or commitment-based safety management. For both management approaches, aggregation of the data to the ward level was justified (control-based safety management ICC(1)=0.19, ICC(2)=0.71, mean r_{wg}=0.97; commitment-based safety management ICC(1)=0.32, ICC(2)=0.83, mean r_{wg}=0.97) (Klein & Kozlowski, 2000). Cronbach's

alpha of the aggregated scales was 0.86 for control and 0.97 for commitment-based safety management.

Nurse managers answered the same set of items, although here the items were adapted in order to assess self-rated control- and commitment-based safety management approaches. To illustrate, in the aforementioned item "The actions of my supervisor" was replaced by "I". In other words, nurse managers responded to the item "I show that patient safety is a top priority". For supervisors, two items were dropped from the initial commitment-based management scale because of high risks of socially desirable answers (namely: "My supervisor does not actually prioritise safety issues as highly as he/she says he/she does" and "Regarding safety, my supervisor's words do not match his/her deeds"). Confirmatory factor analysis provided support for construct validity of the scale measured among nurse managers (χ^2=2090.52, df=456, p<0.05; RMSEA=0.04; TLI=0.98; CFI=0.98). Cronbach's alpha was 0.74 for control and 0.80 for commitment-based safety management.

Team psychological safety was measured using the seven-item scale developed by Edmondson (1999). Items were answered on a 5-point Likert scale, ranging from completely disagree (1) to complete agree (5) and included "If you make a mistake in this team, it is often held against you". Higher scores indicate that nurses feel safer to take interpersonal risks. We obtained support for aggregating data to the ward level (ICC(1)=0.09, ICC(2)=0.50, mean r_{wg}=0.92) (Klein & Kozlowski, 2000). Cronbach's alpha of the aggregated scale was 0.77.

Climate for safety was measured using one dimension of the organisational climate scale by Patterson and colleagues (2005) aligning with the recent interest to focus on facet-specific climates, that is, climates that focus on a specific goal of the organisation (Kuenzi & Schminke, 2009). Climate for safety was measured with the four items from the climate for quality scale adapted from a "quality" to a "patient safety" perspective (Patterson et al., 2005). The scale of Patterson and colleagues best fitted our conceptualisation of a climate for safety because we specifically focused on the perceived importance of patient safety rather than adopting a more hybrid definition incorporating multiple climate dimensions such as common in patient safety literature (Halligan & Zecevic, 2011; Zohar et al., 2007). The items were appropriately modified to the ward level: "Patient safety is taken very seriously in this department". All items were answered using a 4-point Likert scale ranging from totally not true (1) to totally true (4). Higher scores indicate that nurses consider patient safety to be more valued within their ward. We obtained support for aggregating data to the ward level (ICC(1)=0.12, ICC(2)=0.59, mean r_{wg}=0.90) (Klein & Kozlowski, 2000). Cronbach's alpha of the aggregated scale was 0.81.

Individual speaking up attitudes were assessed using a three-item scale based on the communication openness scale (Smits, Christiaans-Dingelhoff, Wagner, van der Wal, & Groenewegen, 2008). In this study, items were specifically targeted at the individual level:

"I speak up if I see something that may negatively affect patient care", "I feel free to question the decisions or actions of those with more authority" and "I am afraid to ask questions when something does not seem right". All items were answered using a 5-point Likert scale ranging from never (1) to always (5). Higher scores indicate that nurses are more willing to speak up. Speaking up was found to be an individual level construct (ICC(1)=0.04, ICC(2)=0.29, mean r_{wg}=0.90) (Klein & Kozlowski, 2000). Cronbach's alpha of this scale was 0.77.

Mean scores were calculated for all of the subscales included in the analysis. To calculate the mean, all of the items scores were added up and then divided by the total number of items in the specific subscale (Field, 2013).

Analysis

A total of 302 nurse managers (response rate 42%) and 2,627 nurses (response rate 22%) completed the survey. We were unable to conduct a non-response analysis because we did not have insight into the relevant characteristics of all of the nurses invited to complete a questionnaire. Yet in terms of age and gender, the characteristics of nurses in our sample resemble the characteristics of the nursing workforce in Dutch hospitals in general (CBS StatLine, 2016). Respondents were included in the analysis if they answered a maximum of 20% of the control- and commitment-based safety management items with the option "I don't know" and gave valid scores for all items of the team psychological safety, climate for safety and speaking up scales. A ward is in turn included in the analysis if one nurse manager and at least five nurses working under direct supervision of this nurse manager met the inclusion criteria, well exceeding the minimum number of respondents per group as recommended by Gerhart et al. (2000) and used in previous studies (e.g., Leroy et al., 2012). More details about the sample selection are available in Figure 2.

First, descriptive statistics and correlations were calculated at ward level for all of the subscales. In order to compare managers' ratings and nurses' perceptions of control- and commitment-based safety management, we conducted paired samples t-tests (2-tailed). A manager's self-rated safety management approach was compared with the (aggregated) perceptions of the nurses working under direct supervision of this particular manager. Furthermore, correlation coefficients were used to gain insight into the strength of the relationships between the manager-rated and nurse-rated management approaches, climate and nurses' speaking up intentions. Subsequently, we used the data collected from nurses to test the associations between the perceived safety management approaches, climate for safety, psychological safety and nurses' willingness to speak up (hypotheses 1–5). Hierarchical regression analyses were carried out to assess the relationships between nurse-perceived safety management and team psychological safety as well as climate for safety. In the analysis, we adjusted for differences between types of wards or hospitals as well as group size, both of which might influence nurses' willingness

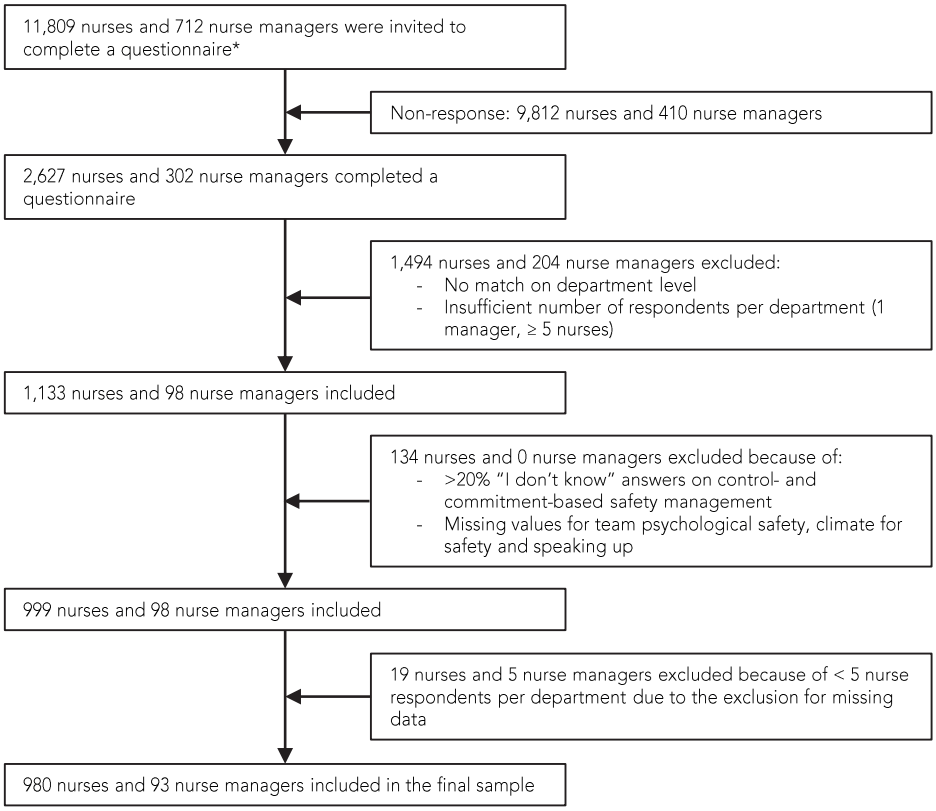

Figure 2 Selection process respondents
* The total number of nurses and nurse managers that were approached to participate may be somewhat overestimated because in six hospitals we were unable to differentiate between occupational groups. Therefore, in these hospitals we counted all of the healthcare professionals and managers who received a questionnaire rather than only the nurses and nurse managers.

to speak up (Morrison, 2011). Therefore, we included the following control variables: type of department (ICU, medical, surgical or mixed ward), type of hospital (general hospital or top-clinical teaching hospital / university medical centre) and the number of respondents per ward. The hierarchical regression analyses were conducted at the ward level of analysis. To examine the association between climate for safety or team psychological safety and nurses' speaking up attitudes, multilevel regression analyses were conducted to take into account the hierarchical nature of our data (Snijders & Bosker, 1999). After all, data on climate for safety and team psychological safety were aggregated to the ward level, whereas nurses' willingness to speak up was found to be an individual-level construct. In these multilevel analyses, we adjusted for individual characteristics associated with variation in speaking up (Morrison, 2011) – namely gender, tenure within the department (in

years) and type of contract (open-ended or fixed-term) – as well as type of ward, type of hospital and number of respondents per department.

To assess mediation effects, we used the procedure recommended by MacKinnon, Fairchild and Fritz (2007). According to these guidelines, a mediation effect exists when the independent variable (i.e., nurse-rated control- or commitment-based safety management) has a significant effect on the mediating variable (i.e., team psychological safety, climate for safety) and the mediating variable has, in turn, a significant effect on the dependent variable (i.e., speaking up attitudes). Finally, we performed two-tailed Sobel tests (Sobel, 1982) and the Monte Carlo method using bootstrapping to assess the significance of a mediation effect (MacKinnon, Lockwood, & Williams, 2004). All analyses were conducted using SPSS V23.0. Results are considered statistically significant if $p<0.05$.

RESULTS

A total of 93 clinical wards with 93 nurse managers and 980 nurses were included in this study (see Table 1). The clinical wards consisted of 50 medical, 23 surgical, 9 mixed medical/surgical wards and 11 ICUs. Per ward, one nurse manager and an average of 11 nurses (range 5-40) completed the questionnaire.

Table 2 presents means, standard deviations and correlations at ward level between the included variables. Small (but positive) correlations are found between manager-rated and nurse-rated control- and commitment-based safety management, respectively $r=0.30$ ($p<0.01$) and $r=0.18$. Paired-samples t-tests reveal statistically significant differences in control-based safety management scores between nurse managers (M=15.73, SD=1.46) and the nurses working under these nurse managers (M=14.77, SD=0.94), $t(92)=6.28$, $p<0.001$. For commitment-based management, significant differences between nurse managers (M=16.68, SD=1.28) and nurses (M=15.31, SD=1.57) are found as well, $t(92)=7.19$, $p<0.001$. Furthermore, only small correlations were found between manager-rated control- and commitment-based safety management and nurses' attitudes and speaking up intentions (r ranges from -0.01 to 0.14). Nurses' perceptions of the management approaches were more strongly related to climate for safety, team psychological safety and nurses' speaking up attitudes (r ranges from 0.17 to 0.72). Therefore, nurse-ratings of the safety management approaches will be used to test our hypotheses.

Table 1 Sample characteristics nurses and nurse managers

Characteristics	Nurses (N=980)		*Nurse managers (N=93)*	
Age	*Mean (range)*	*SD*	*Mean (range)*	*SD*
Age in years	40.4 (18 – 65)	11.6	44.9 (28 – 63)	9.3
Gender	*N*	*%*	*N*	*%*
Male	124	12.7	15	16.1
Female	830	84.7	78	83.9
Missing	26	2.7	-	-
Tenure	*Mean (range)*	*SD*	*Mean (range)*	*SD*
In the current position	12.0 (0 – 47)	9.7	*9.2 (0 – 35)*	*8.3*
In the clinical department	10.3 (0 – 45)	8.5	*9.6 (0 – 32)*	*8.0*
In the hospital	14.6 (0 – 45)	10.5	16.8 (0 – 38)	10.0
Contract	*N*	*%*	*N*	*%*
Open-ended contract	910	92.9	89	95.7
Fixed-term contract	55	5.6	3	3.2
Missing	15	1.5	1	1.1%
Job position nurses	*N*	*%*		
Registered nurse	932	95.1		
Student nurse	*29*	3.0		
Nurse practitioner	19	1.9		

Table 2 Means, standard deviations and correlations at ward level (N=93)

Variable	Mean	SD	1	2	3	4	5	6
1. Manager-rated control-based safety management †	15.73	1.46						
2. Manager-rated commitment-based safety management †	16.68	1.28	.60**					
3. Nurse-rated control-based safety management †	14.77	.94	.30**	.14				
4. Nurse-rated commitment-based safety management †	15.31	1.57	.21*	.18	.68**			
5. Climate for safety ‡	3.31	.21	.13	.03	.72**	.53**		
6. Team psychological safety §	3.89	.23	.02	.10	.44**	.48**	.42**	
7. Speaking up §	3.89	.24	.14	-.01	.20	.17	.21*	.20

Pearson correlations are reported at the ward level of analyses.
*p<0.05 (2-tailed); **p<0.01 (2-tailed).
† scores of this scale could range from 4 to 20; ‡ scores of this scale could range from 1 to 4; § scores of this scale could range from 1 to 5.

Hierarchical regression analyses show that none of the control variables has a significant impact on team psychological safety neither on climate for safety (see Table 3). A significantly positive association is found between nurse-rated commitment-based safety management and team psychological safety (β=0.36; p<0.01). The safety management

approaches explain an additional 24% of the variance of team psychological safety compared with a model that only includes the control variables. These results provide support for hypothesis 1a whereas hypothesis 1b is rejected (β=0.18; n.s.). Furthermore, a significantly positive association is found between nurse-perceived control-based safety management and climate for safety (β=0.74; $p<0.001$). Here, a model in which both management approaches are included explains an additional 56% of the variance of climate for safety compared with a model in which we only include the control variables. These results provide support for hypothesis 2b whereas hypothesis 2a is rejected (β=0.05; n.s.).

Table 3 Hierarchical regression analyses of nurse-rated safety management approaches on climate for safety and team psychological safety (N=93)

	Team psychological safety		Climate for safety	
	model 1 β	model 2 β	model 1 β	model 2 β
Control variables				
Type of ward, reference category ICUs				
Medical wards	.23	.17	-.10	-.25*
Surgical wards	.22	.11	-.02	-.26*
Mixed medical/surgical wards	.20	.18	.08	.04
Type of hospital (top-clinical/UMC)	.16	.13	-.05	-.12
Number of respondents per department	-.04	-.05	-.07	-.05
Safety management approaches				
Nurse-rated control-based safety management		.18		.74***
Nurse-rated commitment-based safety management		.36**		.05
(Δ) R^2	.06	.24	.02	.56
F value	1.16	5.36***	.43	17.33***

*$p<0.05$; **$p<0.01$; ***$p<0.001$

Table 4 presents the multilevel analyses of the relationships between team psychological safety, climate for safety and nurses' speaking up attitudes. Model 1 shows that the control variable tenure within the department has a significant effect on nurses' willingness to speak up (B=0.01; t=2.11; $p<0.05$). In model 2, both management approaches were added to the analysis, followed by team psychological safety and climate for safety in model 3. Nurses' perceptions of neither control- (B=0.02; n.s.) nor commitment-based safety management (B=0.02; n.s.) were found to be significant predictors of nurses' willingness to speak up; nor was climate for safety (B=0.15; n.s.). Only team psychological safety was significantly and positively related to nurses' speaking up intentions (B=0.24; t=2.04; $p<0.05$). As a result hypothesis 3 is supported, whereas hypothesis 4 is rejected.

Mediation of climate for safety is precluded since no significant relationship was found between climate for safety and speaking up. Team psychological safety did, however, meet the criteria for mediation (MacKinnon et al., 2007). Results of a two-tailed Sobel test show that team psychological safety marginally significantly mediates the relationship between nurse-rated commitment-based safety management and nurses' willingness to speak up (t=1.67; $p<0.1$). Additional bootstrap results (2,000 samples) provide further support for mediation because zero is not included in the 95% confidence interval (Bootstrap 95% CI: lower level 0.0003, upper level 0.0295). As a result hypothesis 5a is supported, whereas hypothesis 5b is rejected.

Table 4 Multilevel analyses of climate for safety and team psychological safety on nurses' speaking up attitudes

	Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE
Constant	4.11	.17	3.47	.42	2.67	.53
Individual level						
Nurses' gender (female)	-.02	.06	-.02	.06	-.03	.06
Nurses' tenure within the department	.01*	.00	.01*	.00	.00*	.00
Nurses' type of contract (fixed-term contract)	-.15	.09	-.15	.09	-.15	.09
Ward level						
Type of ward, reference category ICUs						
Medical wards	-.08	.07	-.07	.07	-.07	.07
Surgical wards	-.14	.08	-.12	.08	-.13	.08
Mixed medical/surgical wards	-.13	.10	-.12	.10	-.09	.10
Type of hospital (top-clinical/UMC)	.02	.05	.02	.05	.03	.05
Number of respondents per department	.00	.00	.00	.00	.00	.00
Nurse-rated control-based safety management			.02	.04	-.01	.04
Nurse-rated commitment-based safety management			.02	.02	.00	.02
Team psychological safety					.24*	.12
Climate for safety					.15	.17
Variance components						
Individual level	.341 (.02)		.342 (.02)		.342 (.02)	
Ward level	.010 (.01)		.008 (.01)		.005 (.01)	
-2 Log Likelihood	1634.57		1630.93		1625.51	

Analyses based on data of 980 nurses working at 93 clinical wards
*$p<0.05$

DISCUSSION

This study aimed to explore the relationships between control- and commitment-based safety management, climate for safety, team psychological safety and speaking up of nurses working in clinical hospital wards. In line with prior evidence (Den Hartog et al., 2013; Liao et al., 2009), results reveal a divergence between nurses' and managers' perceptions of the safety management approaches that managers put into practice: nurse managers say they do more on safety management than what is actually perceived by nurses. An explanation for this discrepancy could be that nurses' perceptions of the management approaches are influenced by variation in the actual management practices and also by the quality of communication of their direct supervisor, their attributions of the motives underlying management practices and individual characteristics (Den Hartog et al., 2013; Nishii, Lepak, & Schneider, 2008; Nishii & Wright, 2007). In other words, nurses are possibly not always aware of everything their manager does with regard to patient safety management. If nurses perceive that their nurse manager stresses the importance of safety rules, monitors compliance and provides them with feedback (i.e., control-based safety management), they consider patient safety to be highly valued (climate for safety). Nurses who perceive that their direct supervisor shows commitment and role modelling behaviour, creates awareness and encourages them to participate (i.e., commitment-based safety management), perceive the environment to be psychologically safe for taking interpersonal risks. Team psychological safety is found to be positively related to nurses' willingness to speak up. In other words, when nurses feel safer to take interpersonal risks, they will more frequently raise concerns about patient safety issues. Furthermore, the relationship between nurse-perceived commitment-based safety management and speaking up attitudes is found to be fully mediated by team psychological safety (MacKinnon et al., 2007).

In contrast with prior research (e.g., Leroy et al., 2012; McFadden et al., 2015), no statistically significant association was found between nurses' perceptions of commitment-based safety management and climate for safety. Post-hoc analysis showed that in the absence of control-based management, perceived commitment-based safety management does positively relate to climate for safety but this effect is cancelled out if both management approaches are included in the analysis simultaneously. Thus, our results suggest that nurses in clinical wards receive stronger signals that patient safety is prioritised if their managers emphasise safety rules and foster compliance rather than when they create safety awareness, show commitment and encourage participation. Notably, the levels of climate for safety were lower in medical wards and surgical wards compared with ICUs. Prior research already demonstrated differences in safety climate between clinical wards (e.g., Campbell, Singer, Kitch, Iezzoni, Meyer, 2010; Singer et al., 2009), and future research is needed to further explore variation in the priority of patient safety

between different types of wards. Furthermore, against our expectations, nurse-rated control-based management is not negatively related to team psychological safety; in fact, a (non-significant) positive association is found. In the absence of commitment-based management, nurses' perceptions of control-based safety management do significantly and positively relate to team psychological safety but again this effect is cancelled out if both management approaches are included in the analysis. It seems that, in contrast to the negative connotation that control-based management carries in the literature (Khatri et al., 2006; Walton, 1985), nurses do not experience managerial control as a sign of mistrust but rather as a signal that patient safety is highly valued. This might explain why higher levels of perceived control do not damage a trustworthy environment and do not damage the relationships between employees and their supervisors, which are considered important preconditions for team psychological safety (Edmondson & Lei, 2014). Thus, both control- and commitment-based management seem to be relevant for managing patient safety: the former to highlight the priority of delivering safe patient care and the latter to create a climate in which nurses feel psychologically safe to take interpersonal risks.

Our findings confirm prior evidence that psychological safety is positively related to nurses' willingness to speak up and that it mediates the relationship between perceived leader behaviour and employee voice (Edmondson & Lei, 2014; Newman et al., 2017). As established before, team psychological safety mitigates the fear that speaking up will lead to negative repercussions and, consequently, seems to provide a baseline condition for employees to raise concerns (Liang, Farh, & Farh, 2012). Just like Martinez and colleagues (2015), we did however not find a significant relationship between climate for safety and nurses' speaking up attitudes. Possibly, nurses' willingness to speak up is mainly driven by the confidence that raising patient safety concerns will not have negative personal consequences (i.e., team psychological safety), whereas a climate for safety may be more important for other types of voice behaviour, such as coming up with new ideas or suggestions. If nurses experience that patient safety is prioritised, they will perhaps consider it more worthwhile and effective to voice suggestions for patient safety improvement because they expect their input to be taken seriously. Prior research showed that unique patterns of relationships exist between antecedents (e.g., personality traits) and voice behaviour for different types of voice (Liang et al., 2012; Maynes & Podsakoff, 2014). Future research is needed to explore whether this is also the case for the relationship between climate for safety and individual's speaking up attitudes.

Even though our findings strengthen the idea that perceived leader behaviour is a key determinant of employee voice (Ashford et al., 2009), a substantial part of the variance in speaking up still remains unexplained. Our results suggest that the choice to speak up or remain silent about safety concerns typically is an individual consideration, depending on whether the individual nurse feels safe to speak up or not. Prior research showed that

whether somebody dares to speak up is influenced by perceived leader behaviours and also by one's personality, sense of commitment, communication skills, taken-for-granted beliefs and prior experiences with speaking up. Furthermore, situational factors such as team relationships, the type of message to convey (e.g., traditional versus professionalism-related safety threats), the potential patient harm and the perceived effectiveness of speaking up as well as perceptions of organisational support may also guide employee voice behaviour (Detert & Edmondson, 2011; Martinez et al., 2017; Morrison, 2014; Morrow et al., 2016; Nembhard, Labao, & Savage, 2015; Okuyama et al., 2014; Schwappach & Gehring, 2014). Moreover, Kakkar and colleagues (2016) showed that individual traits may interact with situational features to influence employee voice. Therefore, it may be interesting to combine future research on the influence of leader behaviour with individual-level characteristics such as individuals' personality, prior experiences with speaking up and professional commitment (Morrison, 2011; Okuyama et al., 2014).

The present study has some limitations. First, the cross-sectional design does not support causal relations. Although theoretical insights provide support that leader behaviours influence employee attitudes, which do in turn affect employees' willingness to show certain behaviour (Boxall & Purcell, 2011), additional research using longitudinal data is needed to rule out reverse causality. Nurses' attitudes and behaviour could, potentially, also influence the management practices adopted by nurse managers. Second, our analyses are partly based on same source data, entailing a risk of common method bias (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). Although we collected multisource data, single source data were used to test our hypotheses. In line with prior evidence, employees' perceptions of the safety management approaches appear to be more strongly related to employee attitudes and behavioural reactions than manager ratings of the 'actual' management approaches that are put into practice (Liao et al., 2009; Nishii & Wright, 2007). Furthermore, nurses' experiences of the team psychological safety, climate for safety and their intentions towards speaking up can only be mapped by nurses themselves. Third, despite our large sample, the response rate was relatively low, raising questions about representativeness. The characteristics of nurses in our sample do, however, resemble the characteristics of the nursing workforce in Dutch hospitals in general (CBS StatLine, 2016). Fourth, climate for safety was measured using an adapted subscale of the organisational climate scale instead of a previously validated safety climate questionnaire. The scale of Patterson and colleagues (2005) did better fit our facet-specific conceptualisation of a climate for safety than do commonly used safety climate scales, which adopt a more hybrid definition incorporating multiple climate dimensions (Halligan & Zecevic, 2011; Zohar et al., 2007). Fifth, the speaking up scale used in this study focused on individual speaking up attitudes rather than actual voice behaviours. Our study does not give insight whether nurses' willingness to speak up does actually result in the expression of patient safety concerns. Future research is needed to explore the

relationship between perceived control- and commitment-based safety management, climate for safety, team psychological safety and nurses' speaking up behaviour. Finally, in this study, we exclusively focused on nurse managers and nurses in clinical hospital wards. Future research is needed to test whether our findings hold in other settings and for other occupational groups.

In conclusion, this study provides some first evidence that nurses who perceive higher levels of commitment-based safety management feel safer to take interpersonal risks and are more willing to speak up about patient safety concerns. Furthermore, nurses' perceptions of control-based safety management are found to be positively related to a climate for safety, although no association was found with speaking up. Both control- and commitment-based management approaches seem to be relevant for managing patient safety, but when it comes to encouraging individual's speaking up attitudes, a commitment-based safety management approach seems to be most valuable.