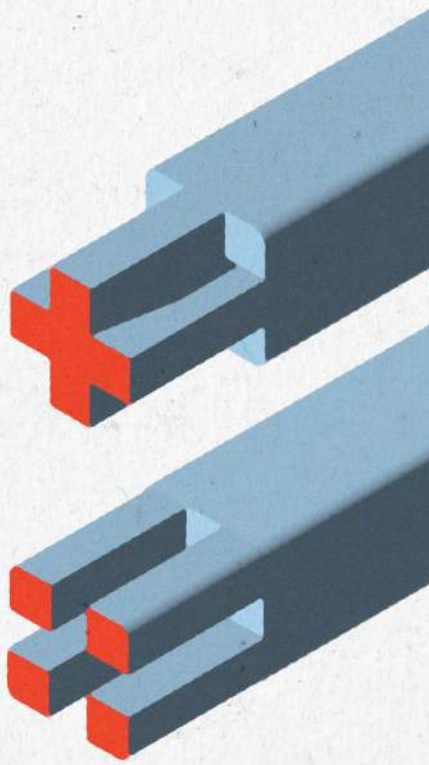
Hujie Wang

# Team functioning in rural Chinese hospitals



王虎杰

# TEAM FUNCTIONING IN RURAL CHINESE HOSPITALS

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# TEAM FUNCTIONING IN RURAL CHINESE HOSPITALS

***Het functioneren van teams in China's rurale ziekenhuizen***

Thesis

to obtain the degree of Doctor from the
Erasmus University Rotterdam
by command of the
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and in accordance with the decision of the Doctorate Board.
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by
Hujie Wang
born in Hunan, China.

**Erasmus University Rotterdam**

## DOCTORAL COMMITTEE

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## CONTENTS

# 1

# Introduction

***Episode 1***

*Interviewer:* *"Have you encountered any challenges and difficulties regarding teamwork [in your hospital] that are not common in national and provincial hospitals?"*

*Respondent A:* *"The recruitment and outflow of talent."*

*Interviewer:* *"Why do you think it is difficult?"*

*Respondent A:* *"In our less affluent areas, the most important thing talent consider is salary. Due to the limitations of this area, the salary we provide may not meet their expectation. Moreover, they may also consider the living environment."*

*Interviewer:* *"What does the living environment mainly refer to?"*

*Respondent A:* *"For example, the educational facilities for children. This area is lagging in nearly all aspects."*

***Episode 2***

*Interviewer:* *"What aspects of interpersonal interaction in team processes can be improved [in your hospital]?"*

*Respondent B:* *"A good thing is that this place is small. People are familiar with each other. There may be many social relationships behind us. For example, two people may be relatives, or their fathers may have been classmates. Therefore, various communication modes exist. However, one bad thing is that healthcare professional may lack education. … Sometimes, there are problems of poor communication between older and younger doctors."*

These are two episodes from interviews with a hospital president and a team leader in rural Chinese hospitals. The responses show that their local context can not only promote teamwork but also bring challenges to team functioning. However, the scientific understanding of the interactions within teams and the role context-related factors play in team functioning in hospitals in these less affluent Chinese rural contexts is limited. This PhD project aims to advance the scientific understanding of team functioning in rural Chinese hospitals, serving around half a billion rural Chinese citizens.

## BACKGROUND

### *Research motivation*

Sustainable Development Goal 3, initiated by the United Nations, advocates good health and well-being for all and universal health coverage (United Nations, n.d.). To achieve this goal, the World Health Organization promotes the quality of care in developing countries (World Health Organization, n.d.; World Health Organization et al., 2018). In alignment with this action, China has been deepening health reforms and paying much attention to allocating more resources to health systems and delivering high-quality care for its 1.4 billion citizens, accounting for about one-sixth of the global population (National Bureau of Statistics of China, 2024; World Bank & World Health Organization, 2019). In recent years, Chinese authorities have collaborated with international organisations such as the World Bank and World Health Organization to seek solutions to improve the quality of care for all citizens. Enhancing teamwork in rural Chinese hospitals has been advocated as a priority for patient-centred care and quality improvement (World Bank & World Health Organization, 2019). This strategy follows the emphasis on teamwork to deliver quality care by the World Health Organization, which is considered to be imperative for universal health coverage (World Health Organization et al., 2018).

Teamwork is pivotal to healthcare (Kohn et al., 2000; Manser, 2009). Current scientific understanding of team functioning in healthcare is mainly from Western countries, with few insights from developing countries, especially from rural areas. However, contextual characteristics may weaken the applicability and validity of extant knowledge built in Western contexts to the contexts in developing countries such as China. For example, the cultural trait power distance is low in many Western contexts, and evidence established in these contexts suggests that lower power distance is believed to promote team functioning. For instance, Appelbaum et al. (2020) find that perceived power distance negatively impact perceived team cohesion and perceived team effectiveness indirectly. China traditionally has a relatively high power distance. Does this cause team cohesion and team effectiveness to be poor in Chinese hospitals, or would the effect of power distance on team functioning be different in this context?

As part of the Chinese health reforms, the Chinese government requires rural Chinese hospitals to enhance multidisciplinary teamwork to provide better care for patients suffering from cancer and complex and multimorbid conditions (National Health Commission & National Administration of Traditional Chinese Medicine, 2018). This policy orientation highlights the role of teamwork in care provision in rural Chinese hospitals and further necessitates evidence-based insights into team functioning in these hospitals.

The research findings of this thesis on teamwork in rural Chinese hospitals may also have relevance for other rural areas of developing countries whose contextual characteristics limit the validity of Western evidence and promote knowledge of teamwork and quality improvement in these areas.

### *Teamwork in healthcare*

Among the various definitions of a team in literature, a commonly adopted definition is that *a team is two or more persons working together and interacting socially towards common goals with relevant tasks, task interdependencies, distinct roles, clear boundaries and links to other units within a broader organisational context* (Kozlowski & Ilgen, 2006; Mathieu et al., 2008). Since the famous publication "To err is human: building a safer health system" revealed the importance of teamwork in patient safety (Kohn et al., 2000), research into team functioning in the healthcare industry has been burgeoning. For example, many reviews show that improved team processes (e.g. communication, coordination and collaboration) is associated with better team performance, such as shortened length of stay, reduced adverse events, incidence of complication and mortality rate and increased diagnostic accuracy (Manser, 2009; Rosen et al., 2018; Schmutz et al., 2019). To comprehensively understand team functioning in healthcare, many researchers propose input-process-outcome-based teamwork models to structure factors influencing team functioning and the connections between them. The input factors in these models are antecedents of team processes, which refer to the interactions within teams, while outcomes are the direct products of team processes and indirect products of team input factors (Schmutz & Manser, 2013). A well-known teamwork model in healthcare settings is the integrated team effectiveness model (ITEM) proposed by Lemieux-Charles& McGuire (2006). This model includes different input factors, processes and team effectiveness. Similar models are also, for instance, built for chronic care (input-process-output and intervention model; Korner et al., 2016) and intensive care (intensive care unit team performance framework; Reader et al., 2009). In addition to the connections across input factors, processes and outcomes, complex relationships may also exist between different input factors. These theoretical models provide a basis to hypothesise relationships relevant to team functioning in rural Chinese hospitals in some of the following chapters.

Because of the crucial role of teamwork in healthcare, hospitals widely implement interventions to enhance team performance with the aim of quality improvement, which has driven an upsurge in the research into team interventions in recent years. For instance, Weaver et al. (2014) synthesise evidence on the effect of team training in healthcare, illustrating improved team processes (e.g. coordination, cooperation and communication) and patient outcomes (e.g. reduced mortality and morbidity). To

draw a complete picture of interventions in healthcare settings, Buljac-Samardzic et al. (2020) systematically categorise team interventions into training, tools, (re)design and programmes. Together with the aforementioned input-process-outcome-based teamwork models, this categorisation forms the theoretical basis for some of the following chapters.

### *Context of rural Chinese hospitals*

Sustainable Development Goal 3 advocates good health and well-being for all (World Health Organization, n.d.). Accordingly, rural health has received increasing attention in recent Chinese health reforms. The National Health Commission divides rural healthcare facilities into county-level hospitals, township health centres and village clinics (Liu et al., 2018; National Health Commission, 2023). Among them, county-level hospitals and township health centres are considered rural hospitals. This classification of the rural health system is based on the hierarchy of administrative divisions and is different from the more commonly used three-tiered categorisation (i.e. tertiary, secondary and primary hospitals) for all Chinese hospitals (Li et al., 2022). The Chinese government has recently repeated the leading role of county-level hospitals in care delivery within the local county regions (General Office of the State Council, 2021). The 17,555 county-level hospitals are required to take the prime responsibilities to provide comprehensive care for the urban population living in the counties and the 477 million rural residents and contribute more than 1.3 billion yearly patient visits (National Bureau of Statistics of China, 2024; National Health Commission, 2023).

Team functioning and care delivery in China's rural county-level hospitals are inevitably influenced by characteristics of the rural context in which they provide care. This context is essentially different from the more extensively researched urban Chinese context in large cities such as Beijing and Shanghai. Despite China's rapid economic development in recent years, urban-rural inequalities continue to exist in China. For example, a recent official report (National Bureau of Statistics of China, 2024) reveals that the per capita yearly disposable income of the 477 million rural residents (about 33.8% of the Chinese population) in 2023 is 21,691 Yuan (i.e. 3,078 US Dollars), much less than the urban figure, 51,821 Yuan (i.e. 7,354 US Dollars). Accordingly, the per capita consumption expenditure of rural residents is 18,175 Yuan (i.e. 2,579 US Dollars) in 2023, nearly 45% lower than the urban residents' 32,994 Yuan (i.e. 4,682 US Dollars). These data reflect that rural China is less developed than urban China. Resources are scarcer (e.g. in terms of financial and human resources), which might influence team functioning in rural Chinese hospitals. Similar challenges have already been reported to negatively influence care delivery and team functioning in regions in other developing countries (Grimes et al., 2011; Lehmann et al., 2008; Saraceno et al., 2007).

On the other hand, traditional Chinese cultural values and local norms may facilitate team functioning. For instance, the Chinese culture of high collectivism is conducive to team functioning in Chinese hospitals (Hai-ping et al., 2020; Hu & Broome, 2019). Shared backgrounds will help build close interpersonal relationships between local healthcare professionals, promoting effective team communication (Wang et al., 2023).

Altogether, it becomes clear that challenges and opportunities for team functioning in rural Chinese hospitals coexist and may complicate the improvement of the quality of care as envisioned in the Chinese health reforms and globally advocated. This PhD thesis aims to advance the scientific understanding of team functioning in hospitals in rural areas of developing countries and focuses on rural Chinese, county-level hospitals. The findings provide knowledge for policymakers and hospital management to design and implement appropriate interventions to improve teamwork and the quality of care.

## RESEARCH QUESTIONS AND OUTLINE OF THE THESIS

This PhD thesis answers five research questions and comprises seven chapters.

**Research question 1**: What do we know about teamwork in Chinese hospitals? (**Chapter 2**)

To start the PhD project, we first map the current scientific understanding of team functioning in Chinese hospitals and identify relevant follow-up research questions based on research gaps. With this purpose, **Chapter 2** systematically reviews the extant evidence on teamwork and team interventions in Chinese hospitals. This systematic review follows the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guideline (Moher et al., 2010; Page et al., 2021). The findings of the 70 included articles are summarised based on the aforementioned input-process-outcome-based teamwork models (Korner et al., 2016; Lemieux-Charles & McGuire, 2006; Reader et al., 2009) and Buljac-Samardzic et al.'s (2020) categorisation of team interventions (i.e. training, tools, (re)design and programme), resulting in two main categories: teamwork components and team interventions.

The teamwork components category synthesises the research into the relationships across various input, process and outcome elements; however, the evidence on these relationships is mostly inconclusive. For team interventions, we find that most regard the (re)design of input factors, while training and tools for improving processes receive less attention. These findings contrast with team interventions studied in Western hospitals, which predominantly focus on improving team processes rather than input factors. In

addition, we notice that most of the included studies are conducted in urban Chinese hospitals, including national and provincial hospitals. Evidence from the large number of rural hospitals, including county-level hospitals, is scarce. As the Chinese health reforms emphasise the role of rural Chinese hospitals in providing high-quality care for all citizens and advocate the enhancement of teamwork in these hospitals as one of the strategies to improve the quality of care, it is urgent to expand the knowledge of team functioning in these hospitals. Therefore, the scant evidence drives us to concentrate on rural Chinese hospitals, especially county-level hospitals in less affluent areas, in the remainder of the PhD project.

**Research question 2**: Which factors influence team functioning, and which interventions are implemented to improve team functioning in county-level hospitals in less affluent areas of China? (**Chapter 3**)

Because of the scarcity of scientific literature on teamwork in China's rural hospitals, **Chapter 3** further explores factors influencing team functioning and interventions for improving teamwork in county-level hospitals in less affluent areas of China via qualitative semi-structured interviews. Continuing our interest in what influences team functioning and how to enhance it via interventions, the interview guide consists of two parts: factors and interventions. The probe into factors influencing team functioning is based on the input factors and processes from teamwork models (Korner et al., 2016; Lemieux-Charles & McGuire, 2006; Reader et al., 2009) with a specific emphasis on the role of context-related factors. The questions about interventions are formulated based on Buljac-Samardzic et al.'s (2020) categorisation (i.e. training, tools, (re)design and programme). We interview the hospital president and a team leader from 15 county-level hospitals, i.e. total of 30 respondents, who provide their views on the factors and interventions regarding team functioning. These interviews identify five main factors: "stuck in the middle", local county setting, difficulty in attracting and retaining talent, strong focus on task design and strong focus on leadership. The interventions implemented in these hospitals mainly focus on input factors again. However, because of the emphasis on multidisciplinary teams in the Chinese health reforms, interventions focussing on improving team processes, such as simulation training and continuous process improvements, have played a more crucial role in improving teamwork and the subsequent quality of care than before.

Notably, the five main factors mentioned above delineate a highly context-specific picture and help us identify theoretically and practically relevant relationships among a number of factors for further research in Chapters 4 to 6.

To investigate these relationships, we conduct cross-sectional survey studies. We disseminate online questionnaires to doctors, nurses and other healthcare professionals in four rural Chinese hospitals. As respondents are nested in their respective teams, we use multilevel analyses to examine the hypotheses proposed in Chapters 4 to 6.

Chapter 3 finds that most healthcare professionals in rural Chinese hospitals are locals who share backgrounds. This situation may cause team members to perceive each other as similar and promote interaction. However, recent strategies to widely attract young and more highly-educated talent have increased diversity in healthcare teams, potentially bringing new challenges to team functioning. The findings from Chapter 3, for example, suggest that increased generational diversity not only brings more up-to-date professional knowledge to the team but may also produce communication barriers. These findings motivate us to investigate the potential connection between generational diversity and perceived similarity and their impacts on teamwork behaviour.

**Research question 3**: How do generational diversity and perceived similarity influence speaking up, silence and knowledge sharing in rural Chinese hospitals? (**Chapter 4**)

To address this question, **Chapter 4** puts an eye on generational diversity in healthcare teams and studies the relationship between generational diversity and perceived similarity, as well as the associations of these input factors with the processes speaking up, silence and knowledge sharing in rural Chinese hospitals. Unlike the flexible composition of multidisciplinary teams, the fixed composition of monodisciplinary teams makes it possible to measure the generational diversity within a team. Therefore, this study exclusively includes 841 healthcare professionals from monodisciplinary teams in the four participating hospitals.

The constructs diversity and dissimilarity are used interchangeably in the scientific literature (Hobman et al., 2004; Jansen & Searle, 2021) and divided into two levels: surface-level and deep-level. Surface-level diversity or (dis)similarity is related to overt surface-level attributes, such as demographic characteristics (e.g. age, gender and race). Deep-level diversity or (dis)similarity is associated with underlying deep-level attributes (e.g. values, beliefs and attitudes) (Shemla et al., 2016; Williams et al., 2007). In this chapter, generational diversity is a form of surface-level diversity. Perceived similarity refers to similarity in values, beliefs and attitudes and is, therefore, deep-level similarity. We hypothesise that surface-level generational diversity is negatively associated with the deep-level perceived similarity in rural China, which has seen tremendous economic and societal dynamics in the past decades that may enlarge intergenerational differences and, subsequently, exert profound impacts on team functioning (Yi et al., 2010).

The similarity attraction theory (Byrne, 1971) suggests more interaction between similar people, providing theoretical support for hypothesising an association of perceived similarity with interactive teamwork behaviour (i.e. speaking up, silence and knowledge sharing), pivotal for patient safety and quality of care. Furthermore, perceived similarity is hypothesised to be a mediator between generational diversity and the aforementioned teamwork behaviour. To sum up, the conceptual model for Chapter 4 is presented in **Figure 1**.

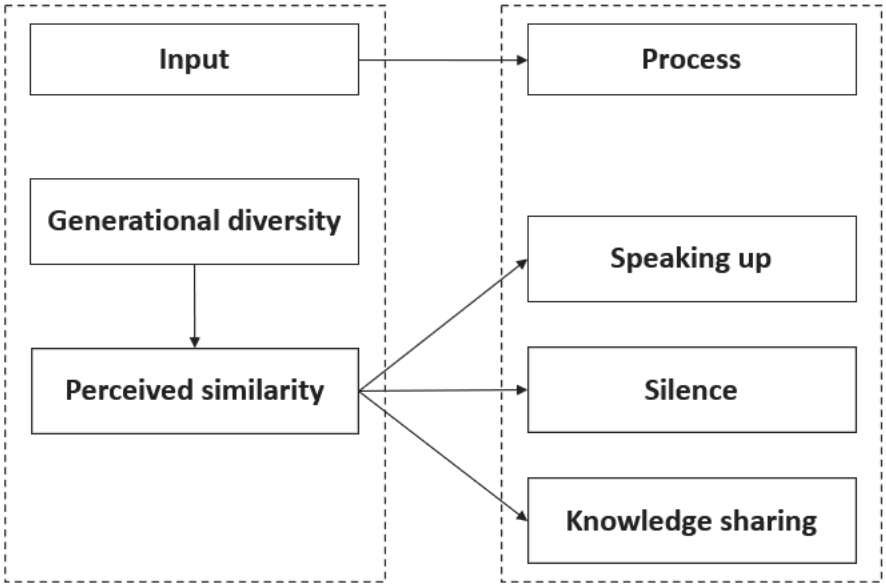


Figure 1. Conceptual model (Chapter 4)

Chapter 3 findings highlight the importance of the leader in team processes and outcomes in rural Chinese hospitals, driving us to focus on the leader-member relationships in Chapter 5. As most of the leaders and members are locals and, therefore, have similar backgrounds, it is likely that these team members perceive their leaders to be similar to themselves and behave interactively. This might be counterbalanced by the high power distance in Chinese society (Hofstede, 1980).

**Research question 4**: How do leader-member perceived similarity and power distance orientation influence perceived quality of care and job satisfaction via speaking up and silence in rural Chinese hospitals? (**Chapter 5**)

To answer this research question, we collect data from 1,017 healthcare professionals in mono- and multidisciplinary teams in the four participating hospitals via an online questionnaire. **Chapter 5** presents the resulting evidence on the relationships among

leader-member perceived similarity, power distance orientation, speaking up, silence, perceived quality of care and job satisfaction in rural Chinese hospitals.

As before, the similarity attraction theory (Byrne, 1971) supports the association of leader-member perceived similarity with speaking up and silence, which are crucial for patient safety and quality of care. Power distance orientation is assumed to be negatively related to speaking up and positively to silence based on the cultural dimensions theory (Hofstede, 1980), which suggests that people with a high power distance orientation readily accept unequally distributed power and are, therefore, less likely to voice to oppose leaders' decisions. In addition, speaking up and silence are evidenced to impact team outcomes (Henriksen & Dayton, 2006; Liang & Yeh, 2020; Okuyama et al., 2014; Vakola & Bouradas, 2005), supporting the association of these two behaviours with team effectiveness (i.e. perceived quality of care and job satisfaction) in this study. The input-process-outcome-based teamwork models (Korner et al., 2016; Lemieux-Charles & McGuire, 2006; Reader et al., 2009) further build a bridge from leader-member perceived similarity and power distance orientation to perceived quality of care and job satisfaction, mediated by speaking up and silence. The conceptual model for Chapter 5 is presented in **Figure 2**.

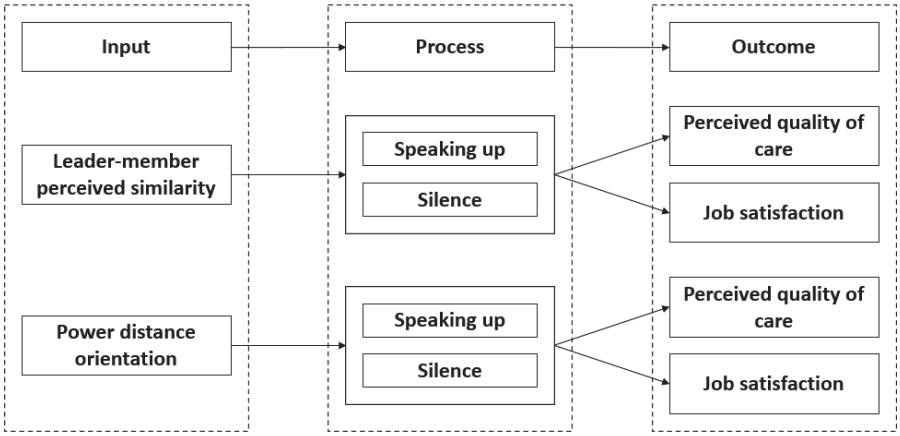


Figure 2. Conceptual model (Chapter 5)

In addition to the similarity between team members mentioned above, Chapter 3 also highlights the role of multidisciplinary teams in care delivery for multimorbid patients in rural Chinese hospitals. Literature shows that multidisciplinarity brings benefits and obstacles to team coordination (Hartgerink et al., 2014; Tumienė et al., 2022) and may influence team functioning. Due to the short history and complex tasks involved in these teams, it is still unknown how multidisciplinarity influences team functioning in rural Chi-

nese hospitals. Multidisciplinarity may impact perceived similarity, and both these input factors may impact team processes and outcomes. More specifically, we investigate:

**Research question 5**: How do perceived similarity and multidisciplinarity influence coordination and perceived quality of care in rural Chinese hospitals? (**Chapter 6**)

**Chapter 6** examines how perceived similarity and multidisciplinarity interact and subsequently influence coordination and perceived quality of care in rural Chinese hospitals. We collect data via online questionnaire from 1,017 healthcare professionals in mono- and multidisciplinary teams in the four participating hospitals to answer research question 5.

Perceived similarity may be related to coordination by the similarity attraction theory (Byrne, 1971). The input-process-outcome-based teamwork models (Korner et al., 2016; Lemieux-Charles & McGuire, 2006; Reader et al., 2009) establish the connection between perceived similarity and perceived quality of care via coordination. Nonetheless, the task complexity and different roles due to multidisciplinarity may create conflicts and boundaries (Liberati et al., 2016), even between similar team members, subsequently hindering the coordination of tasks and activities and, therefore, attenuating the positive impact of perceived similarity on coordination. The conceptual model for Chapter 6 is presented in **Figure 3**.

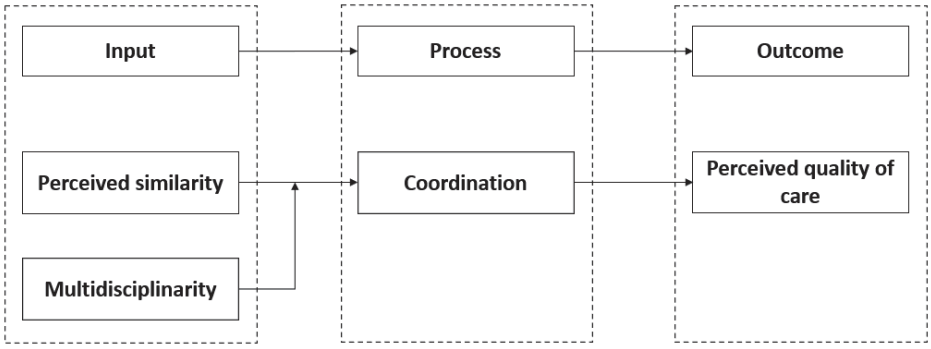


Figure 3. Conceptual model (Chapter 6)

**Chapter 7** summarises the findings for each of the five research questions, discusses three overarching themes across this research findings, reflects on methodology and provides insights for hospital management and policy.

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# 2

# What do we know about teamwork in Chinese hospitals? A systematic review

Wang, H., Buljac-Samardzic, M., Wang, W., van Wijngaarden, J., Yuan, S., & van de Klundert, J. (2021). What do we know about teamwork in Chinese hospitals? A systematic review. *Frontiers in Public Health*, *9*, 735754.

## ABSTRACT

**Introduction**: Improving quality of care is one of the primary goals in current Chinese hospital reforms. Teamwork can play an essential role. Characteristics of teamwork and interventions for improving teamwork in hospitals have been widely studied. However, most of these studies are from a Western context; evidence from China is scarce. Because of the contextual differences between China and Western countries, empirical evidence on teamwork from Western hospitals may have limited validity in China. This systematic review aims to advance the evidence base and understanding of teamwork in Chinese hospitals.

**Methods**: Both English (i.e. Embase, Medline, and Web of Science) and Chinese databases (i.e. CNKI, CQVIP, and Wanfang) were searched for relevant articles until February 6, 2020. We included the studies that empirically researched teamwork in Chinese hospitals. Studies were excluded if they (1) were not conducted in hospitals in Mainland China, (2) did not research teamwork on team interventions, (3) were not empirical, (4) were not written in English or Chinese, (5) were not published in peer-reviewed journals and (6) were not conducted in teams that provide direct patient care. Both deductive and inductive approaches were used to analyse data. The Mixed Methods Appraisal Tool (MMAT) was used to assess their methodological quality.

**Results**: A total of 70 articles (i.e. 39 English articles and 31 Chinese articles) were included. The results are presented in two main categories: Teamwork components and Team interventions. The evidence regarding the relationships among inputs, processes and outcomes is scarce and mostly inconclusive. The only conclusive evidence shows that females perceive better team processes than males. Similar types of training and tools were introduced as can be found in Western literature, all showing positive effects. In line with the Chinese health reform, many of the intervention studies regard the introduction of multidisciplinary teams (MDTs). The evidence on the implementation of MDTs reveals that they have led to lower complication rates, shorter hospital stays, higher diagnosis accuracy, efficiency improvement and a variety of better disease-specific clinical outcomes. Evidence on the effect on patient survival is inconclusive.

**Conclusion**: The Chinese studies on teamwork components mainly focus on the input-process relationship. The evidence provided on this relationship is, however, mostly inconclusive. The intervention studies in Chinese hospitals predominantly focus on patient outcomes rather than organisational and employee outcomes. The introduction of training, tools and MDTs generally shows promising results. The evidence from primary hospitals and rural areas, which are prioritised in the health reforms, is especially scarce.

Advancing the evidence base on teamwork, especially in primary hospitals and rural areas, is needed and can inform policy and management to promote the health reform implementation.

**Keywords:** teamwork, team performance, team intervention, multidisciplinary team, Chinese hospitals.

## INTRODUCTION

Improving the quality of hospital care has been one of the primary goals of the Chinese national health reform since 2009 (The Central People's Government of the People's Republic of China, 2009). In recent years, the Chinese government has been making efforts to explore strategies to reach this goal. In Western countries, facilitating interdisciplinary communication, collaboration and teamwork are emphasised in many quality improvement strategies for hospital care (R. Hughes, 2008; Scott,2009). The World Bank and the World Health Organization have also recommended China to enhance teamwork within medical teams of hospitals as a managerial practice to promote the delivery of high-quality hospital care (World Bank & World Health Organization, 2019). However, a systematic scientific understanding of teamwork and its relationship to the quality of hospital care in China is lacking.

Teamwork significantly impacts the quality and safety of care. Failure in teamwork can result in (preventable) medical errors and adverse events (El-Dawlatly et al., 2004; Pronovost et al., 2006; Spath, 2011; Suresh et al., 2004), while improving teamwork is beneficial for the quality of care (Kohn et al., 2000; Manser, 2009). Numerous literature reviews have considered teamwork and the improvement of teamwork in hospitals (Buljac-Samardzic et al., 2020; A. Hughes et al., 2016; Lemieux-Charles & McGuire, 2006; Mickan & Rodger, 2000). Some reviews focus on characteristics that are important for teamwork and team performance. For instance, Mickan and Rodger (2000) summarise the characteristics of an effective team in hospitals (e.g. suitable leadership, trust, coordination and communication) and suggest finding a balance between organisational structure and team processes. Lemieux-Charles and McGuire (2006) have developed an Integrated (Health Care) Team Effectiveness Model (ITEM), showing the relation between team characteristics, team processes, psycho-social traits and team performance. Other reviews focus on interventions to improve teamwork in hospitals. For example, Buljac-Samardzic et al. (2020) present an overview of team interventions (i.e. training, tools, (re)design and programme) to improve team effectiveness, and A. Hughes et al. (2016) show a positive impact of team training on trainees' reactions to training, learning outcomes, behaviours and organisational and patient outcomes. A solid body of evidence on teamwork in hospitals exists. With few exceptions, however, the studies included in these reviews are from Western countries. For example, only one study from Buljac-Samardzic et al.'s review (2020) is conducted in Mainland China.

Cultural differences between China and Western countries may influence people's behaviours in a team. For instance, Chinese people emphasise collectivism and are more likely to avoid conflict to preserve harmony within their teams, while people

from Western countries prefer individualistic values and are prone to debate with their teammates when disagreement emerges (Hofstede Insights, n.d.; Meyer, 2014). Tjosvold et al. (2003) provide empirical evidence showing that collectivism has a positive effect on constructive controversy, which in turn positively influences the performance of teams in Chinese factories. Hui et al. (2007) provide evidence of the positive relationship between collectivism and team performance. These examples suggest that teams in Chinese hospitals function differently from those in Western hospitals, which may subsequently translate into differences regarding characteristics of teamwork and the effectiveness of interventions. In other words, the empirical evidence on teamwork from Western hospital settings may have limited validity in a Chinese setting. With the aim to advance the scientific evidence base and understanding of teamwork in Chinese hospitals, we conducted a systematic review to address the following research question: What is the present empirically based knowledge on teamwork in Chinese hospitals?

## METHODOLOGY

This systematic review was conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement (Moher et al., 2009; Page et al., 2021). The review protocol was registered in PROSPERO (No. CRD42020175069).

### *Search strategy*

English and Chinese databases were searched for published articles, not restraining the year of publication. A medical librarian from the Erasmus Medical Centre developed the English query, which consisted of keywords that combined three areas: (1) teamwork or team interventions (e.g. teamwork, team performance, team effectiveness, multidisciplinary team, and team training); (2) hospital setting (e.g. hospital and healthcare); and (3) China (i.e. China, Chinese, and the names of the 31 administrative regions in Mainland China). This query was searched in Embase, Medline and Web of Science on February 6, 2020. A Chinese medical librarian assisted in translating the English query and finalising the Chinese query (both the English and Chinese queries are shown in Supplementary file 1). The Chinese databases CNKI, CQVIP, and Wanfang were searched for articles until February 6, 2020. Finally, 1533 records were retrieved after all the duplicates deleted: 996 from English databases and 537 from Chinese databases.

### *Inclusion and exclusion criteria*

Based on the research question, we aimed at including studies that empirically researched teamwork in Chinese hospitals. The following exclusion criteria were established: (1) studies that were not conducted in hospitals located in Mainland China; (2) studies that

do not provide information about teamwork or team interventions; (3) non-empirical studies, such as editorial letters and literature reviews; (4) articles that are not written in English or Chinese; (5) articles that are not published in peer-reviewed journals, such as conference papers and dissertations; and (6) studies conducted in departments that do not provide direct patient care, such as pharmacy, laboratory, administration, logistics and information technology.

### *Selection process*

There were two stages of selecting articles. Each stage consisted of an English and a Chinese part. Firstly, the titles and abstracts retrieved from both the English and Chinese databases were independently screened by two researchers according to the above-mentioned exclusion criteria. In case of disagreement between the two researchers, consensus would be reached through discussion. In case of any doubt, it was transferred to the second stage. This first stage resulted in a selection of 363 articles (from the 1533): 264 from English databases and 99 from Chinese databases. Surprisingly, 123 out of the 264 articles with English titles and abstracts are actually written in Chinese. Hence, the numbers of articles written in English and Chinese were adjusted to 141 and 222, respectively. Secondly, the full texts of the 363 articles were independently reviewed by the same researchers of the first stage. In case of disagreement, a third researcher would settle it. Finally, 70 articles (i.e. 39 English articles and 31 Chinese articles) were included for data synthesis. Figure 1 shows the screening and reviewing process based on the PRISMA Flow Diagram.

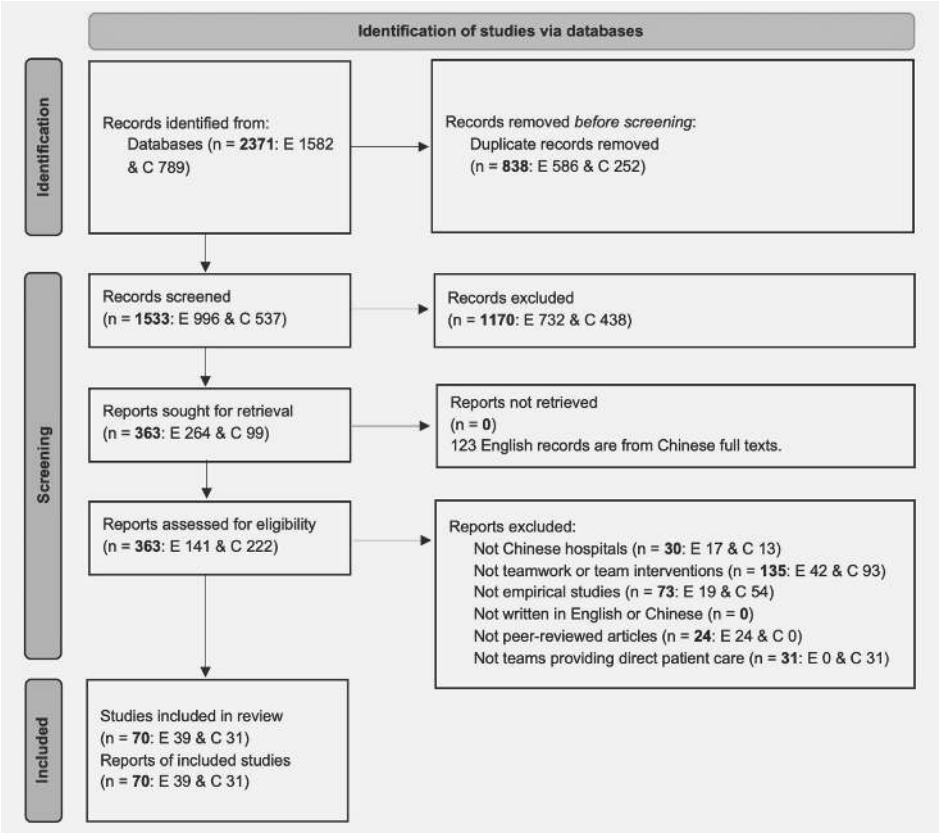


Figure 1 PRISMA Flow Diagram
Abbreviations: E=English; C=Chinese.

### *Data synthesis*

The conducted analysis combined deductive and inductive elements and consisted of four steps.

As a first step, we extracted data from the included articles in terms of author (year), research aim, setting, administrative regions, research methods, time period, main focus of teams considered, team interventions considered (if any), findings related to teamwork (if any), other findings, potentially relevant information from the discussion section, interpretation specifically relevant to the Chinese context, and conclusion. These data fields were selected to systematically extract all information relevant to our research question. In this step, the data from the Chinese articles were translated into English.

The second step combined deductive and inductive approaches to create primary result categories (Azungah, 2018). The classical (Western) reviews (Buljac-Samardzic et al., 2020; Dietz et al., 2014; Korner et al., 2016; Lemieux-Charles & McGuire, 2006) served as deductive starting points for the categorisation process. We used the categories of the ITEM model, which describes team inputs, processes and outcomes in health care, as well as their interrelations (Lemieux-Charles & McGuire, 2006). In addition, we included categories identified by systematic reviews on teamwork components (i.e. inputs, processes and outcomes) in intensive care and chronic care (Dietz et al., 2014; Korner et al., 2016).

Combining the categorisation in these reviews (deduction) with an initial inductive analysis of the data collected, we identified the input element "team composition" as a first primary category and added articles that research the composition of teams in hospitals to this primary category.

Buljac-Samardzic et al. (2020) summarise the interventions implemented in health care teams and categorise the interventions as training, tools, (re)design and programme. The second primary category "team interventions" was established based on this review and consisted of articles reporting on interventions on teams in hospitals.

Two additional primary categories were inductively formed to classify the remaining articles. The category "describing teamwork" included descriptive studies reporting on teamwork via questionnaires, interviews or both. The category "the influence of teamwork on performance" consisted of articles addressing the influence of teamwork on team performances.

In the third step, these primary categories were repeatedly adjusted based on discussions among all authors. The category "team interventions" remained unchanged, while "team composition" was divided into two parts. The first part was composed of studies that actually examine the relationship between the three teamwork components (i.e. inputs, processes and outcomes) (Dietz et al., 2014; Korner et al., 2016; Lemieux-Charles & McGuire, 2006). Articles in the primary categories "describing teamwork" and "the influence of teamwork on performance" also research the three teamwork components and the relationships between them. Therefore, these two primary categories were merged with the first "team composition" category, forming a new category "teamwork components" (Dietz et al., 2014; Korner et al., 2016; Lemieux-Charles & McGuire, 2006). The second part of "team composition" consisted of studies that research interventions on team composition (i.e. (re)design and programme) and was added to the category

"team interventions". These adjustments resulted in the two final categories "teamwork components" and "team interventions".

In step four, the two categories were further divided into several subcategories according to the theoretical frameworks and reviews mentioned above (Buljac-Samardzic et al., 2020; Dietz et al., 2014; Korner et al., 2016; Lemieux-Charles & McGuire, 2006). The first category "teamwork components" was divided into processes, relationship between inputs and processes, relationship between inputs and outcomes, and relationship between processes and outcomes based on the teamwork theoretical models (Dietz et al., 2014; Korner et al., 2016; Lemieux-Charles & McGuire, 2006). The second category "team interventions" included training, tools, (re)design and programme, in accordance with the categorisation of Buljac-Samardzic et al.'s review (2020). Table 1 shows the categorisation of results and the number of articles per category and subcategory.

### *Quality assessment*

The Mixed Methods Appraisal Tool (MMAT) was used to assess the methodological quality of the included studies (Q. Hong et al., 2018). The quality score of a study, ranging from 0 to 5, was the number of criteria a study met. All the studies were divided into high quality (scoring 4 or 5) and low quality (scoring 3 or less) studies (Charette et al., 2020).

**Table 1 Categorisation of results**

| Main category | Subcategories | Number of articles |
|---|---|---|
| Teamwork components: | | 25* |
| | Processes | 4 |
| | Relationship between inputs and processes | 16 |
| | Relationship between inputs and outcomes | 4 |
| | Relationship between processes and outcomes | 3 |
| Team interventions: | | 45 |
| | Training | 6 |
| | Tools | 3 |
| | (Re)design | 20 |
| | Programme | 16 |
| Total | | 70 |

* Two studies researched two kinds of relationships each, thus the total number of studies in the four subcategories exceeds the number of studies of the category "teamwork components".

## RESULTS

### *Overall findings*

Most studies in the first category address relationships across the three components of the input-process-outcome framework. The second category describes the specific interventions implemented and their effects on outcomes. More than 70% of the studies were conducted in tertiary hospitals. With one exception, all studies were situated in urban hospitals. In the following paragraphs, we summarise the main findings of the review. Appendix 1 and 2 provide a complete overview of the results.

Based on the MMAT scores, the majority of the studies (60 out of 70 studies) are of high methodological quality, while the other ten studies are of low quality in the research design. The quality of research design of each study is also shown in both Appendix 1 and 2.

### *Teamwork components*

*Processes*

Collaboration is one of the process elements of the ITEM model (Lemieux-Charles & McGuire, 2006) and two out of the four studies in this subcategory focus on collaboration (Hu & Broome, 2019; L. Zhou & Nunes, 2012). Sharing the same goal is one of the strategies that facilitate the collaboration within a team (Hu & Broome, 2019), while lack of common ground is a barrier to the collaboration between healthcare professionals (L. Zhou & Nunes, 2012). The other two studies measure team processes with two well-known patient safety culture questionnaires: the Hospital Survey on Patient Safety Culture (HSOPSC) (i.e. "teamwork within units", "teamwork across units" and "communication openness") and the Safety Attitudes Questionnaire (SAQ) (i.e. "teamwork climate") (Agency for Healthcare Research and Quality, 2021; Cui et al., 2017; Sexton et al., 2006; Zhong et al., 2019). One of these two studies compare results between Chinese and US hospitals, showing significantly higher scores of "teamwork within units" and "teamwork across units" but significantly lower scores of "communication openness" in the Chinese hospital (Zhong et al., 2019).

*Relationship between inputs and processes*

Sixteen studies explore the relationship between inputs and processes (Chu et al., 2014; Feng et al., 2012; Hai-ping et al., 2020; Jia et al., 2017; K. Jiang et al., 2019; C. Liu et al., 2014; Nie et al., 2013; C. Song et al., 2014; W. Song et al., 2019; M. Wang & Tao, 2017; S. Wang et al., 2016; Y. Xie & X. Xu, 2011; X. P. Xu et al., 2018; F. Zhang et al., 2018; C. Zhao et al., 2019; X. Zhao et al., 2017). The majority of the articles in this subcategory

are based on HSOPSC and SAQ (10 out of 16) (Feng et al., 2012; K. Jiang et al., 2019; C. Liu et al., 2014; Nie et al., 2013; M. Wang & Tao, 2017; S. Wang et al., 2016; X. P. Xu et al., 2018; F. Zhang et al., 2018; C. Zhao et al., 2019; X. Zhao et al., 2017). The input "gender" is found to influence team processes. Female staff perceive significantly better "communication openness" (X. P. Xu et al., 2018), "teamwork within units" (X. Zhao et al., 2017) and "teamwork climate" (C. Zhao et al., 2019) than male staff. The relationship between the input "profession" and team processes is inconclusive, although profession is researched the most in these studies. Two HSOPSC studies show that nurses score "communication openness" significantly higher than doctors (Nie et al., 2013; X. P. Xu et al.,2018), while two other HSOPSC studies find no significant differences between the ratings of doctors and nurses (C. Liu et al., 2014; X. Zhao et al., 2017). Two SAQ studies find that doctors evaluate "teamwork climate" significantly more positively than nurses (K. Jiang et al., 2019; C. Zhao et al., 2019).

Mixed results are also found in terms of education level and age. Staff with a degree higher than bachelor score "communication openness" (X. P. Xu et al., 2018) and "teamwork across units" (X. Zhao et al., 2017) significantly higher but "teamwork climate" significantly lower than those with an education level lower than bachelor (K. Jiang et al., 2019; C. Zhao et al., 2019). Staff younger than 25 years report significantly higher scores for "teamwork climate" than those older than 50 years in one study (C. Zhao et al., 2019) but the opposite is found in another study (K. Jiang et al., 2019). Besides, two HSOPSC studies compare the results between China and the US without testing significance, showing that overall Chinese healthcare professionals score higher in the three process related composites than their counterparts in the US (Nie et al., 2013; X. P. Xu et al., 2018), except for "teamwork across units" in one study (X. P. Xu et al., 2018).

Five out of the six remaining studies investigate the input-process relationship via other questionnaires (Chu et al., 2014; Jia et al., 2017; C. Song et al., 2014; W. Song et al., 2019; Y. Xie & X. Xu, 2011). Similar to the findings of the previous HSOPSC and SAQ studies, female doctors perceive significantly better team interaction (e.g. communication, coordination and mutual help) than male doctors (W. Song et al., 2019). Profession, department and age also influence healthcare professionals' ratings on team processes. The overall teamwork scores of internal medicine nurses are significantly lower than those of surgical nurses (Chu et al., 2014; C. Song et al., 2014). However, internal medicine doctors score team interaction significantly higher than surgeons (W. Song et al., 2019). Staff younger than 30 years perceive better overall teamwork than those older than 30 years in one study (C. Song et al., 2014) but score team cohesion significantly lower than those between 40 and 50 years old in another study (Y. Xie & X. Xu, 2011). In addition, cultural values are considered to affect team processes (Hai-ping et al., 2020).

Feminine traits (e.g. friendship, enthusiasm and patience) are shown to be beneficial to communication; collectivism facilitates the mutual support, while a clique culture hinders it.

*Relationship between inputs and outcomes*

Four studies examine the correlation between inputs and outcomes (W. He et al., 2014; S. Hong & Q. Li, 2017; J. Liu et al., 2010; X. Liu et al., 2020). Disciplinary diversity shows positive effects on team performance (i.e. the number of team consultations) (X. Liu et al., 2020). Tenure and team size are found to influence team outcomes. Staff working between 16 and 30 years perceive significantly worse job satisfaction than other staff (J. Liu et al., 2010), while nurses working more than 20 years report significantly more adverse events than those working less than 20 years (S. Hong & Q. Li, 2017). Adding additional members to a stable surgical team increases the surgical procedure time (W. He et al., 2014).

*Relationship between processes and outcomes*

Three studies investigate the process-outcome relationship (S. Hong & Q. Li, 2017; P. Liu et al., 2018; W. Song et al., 2019). Teamwork is a positive predictor to nurses' adverse events reporting (S. Hong & Q. Li, 2017) but is negatively related to nurses' willingness to make plans for their retirement (P. Liu et al., 2018). All the six factors of team interaction (i.e. communication, coordination, mutual help, team goals, work norms, and cohesion and conflict resolution) are inversely related to physicians' burn-out (W. Song et al., 2019).

## *Team interventions*

*Training*

Training as a team intervention focuses on enhancing inputs and team processes, consequently resulting in improved outcomes. Most studies on training evaluate simulation-based training. Simulation, the core of simulation-based training, refers to "a technique to replace or amplify real-patient experiences with guided experiences, artificially contrived, that evokes or replicates substantial aspects of the real world in a fully interactive manner" (Aggarwal et al., 2010). All the five studies on simulation-based training are conducted in emergency settings (e.g. trauma care, paediatric septic shock, cardiac surgeries and advanced cardiac life support) (Y. Hong & Cai, 2018; T. Liu et al., 2019; Qian et al., 2016; X. Xie et al., 2011; L. (Lu-Feng) Zhang et al., 2018). The forms of simulated scenarios include mannequins (T. Liu et al., 2019), simulators (Qian et al., 2016) and animals (L. (Lu-Feng) Zhang et al., 2018). Two studies find the inputs (e.g. surgical skills and emergency skills) significantly improved after the training (X. Xie et al.,

2011; L. (Lu-Feng) Zhang et al., 2018), while two other studies observe significantly better outcomes (e.g. task complete compliance and work efficiency) in the simulation group, compared to the non-simulation group (Qian et al., 2016) or pre-intervention group (Y. Hong & Cai, 2018). One study concludes that licensed perfusionists score communication and coordination higher than the trainees in a cardiac surgery simulation scenario, without testing significance (T. Liu et al., 2019). In addition to the studies on simulation-based training, there is one study on TeamSTEPPS (i.e. Team Strategies and Tools to Enhance Performance and Patient Safety). TeamSTEPPS is a training system aiming at improving healthcare professionals' teamwork and communication skills (inputs), facilitating information sharing, resolving conflicts (processes) and finally providing better patient care (outcomes) (Agency for Healthcare Research and Quality, 2019a). This study on TeamSTEPPS presents descriptive results that more healthcare professionals rate their communication skills as good after the training (Sun et al., 2016).

*Tools*

Tools in this subcategory refer to SBAR (i.e. Situation-Background-Assessment-Recommendation tool) and checklists, both aiming at optimising the team processes. SBAR is a structured template used to facilitate the communication between team members (Institute for Healthcare Improvement, 2021). Two studies have evaluated SBAR and show significantly better patients' and healthcare professionals' satisfaction, and a significant decrease in the incidence of adverse events (Wen et al., 2017; X. Yang et al., 2019). Moreover, one of these two studies also shows higher work efficiency (Wen et al., 2017). A checklist is a list of actions to be done in a hospital setting, with the goal of avoiding any steps being forgotten (Agency for Healthcare Research and Quality, 2019b). Yuan et al. (2018) have implemented a self-developed electronic checklist for multidisciplinary team meetings and report significantly higher working efficiency and diagnosis accuracy and lower hospital stay but no significant change in terms of the incidence of complications.

*(Re)design*

(Re)design is defined as constructing or revising the input characteristics and/or the processes of a medical team within hospitals.

Multidisciplinary teams (MDTs) are the main focus of most studies in this subcategory (18 out of 20 studies) (Y. Chen et al., 2018; Du et al., 2011; Z. He et al., 2014; W. (Wei) Li et al., 2019; W. (Weiqin) Li et al., 2009; Lin & Pan, 2013; Q. (Qiangui) Liu et al., 2009; Lu et al., 2020; Luo et al., 2019; Rui et al., 2019; J. Wang & Guo, 2018; D. Wu & Y. Chen, 2016; X. Wu et al., 2019; Xue et al., 2019; Ye et al., 2012; L. (Le) Zhang et al., 2019; S. Zhang et al., 2019; M. Zhao et al., 2014) . An MDT is a team consisting of healthcare professionals from dif-

ferent disciplines that work together to provide better patient care (Taberna et al., 2020). Five studies describe or evaluate the effects of establishing MDTs (revising the inputs) in cancer (Y. Chen et al., 2018; Du et al., 2011)( Ye et al., 2012), trauma (S. Zhang et al., 2019), and stroke care (D. Wu & Y. Chen, 2016). Significantly higher diagnosis accuracy and lower incidence of complications and hospital stay are reported in these studies (Y. Chen et al., 2018; Ye et al., 2012; S. Zhang et al., 2019). Eight studies implement MDTs with clarified roles and responsibilities of team members (defining the inputs) (Z. He et al., 2014; W. (Wei) Li et al., 2019; W. (Weiqin) Li et al., 2009; Lin & Pan, 2013; Q. (Qiangui) Liu et al., 2009; Luo et al., 2019; J. Wang & Guo, 2018; L. (Le) Zhang et al., 2019), which results in significantly higher quality of life and patients' satisfaction and lower incidence of complications. The other five studies on MDT consider the standardisation and optimisation of the working procedures of MDTs (optimising team processes) through a pathway of care (X. Wu et al., 2019), a new procedure (Rui et al., 2019; Xue et al., 2019; M. Zhao et al., 2014) or re-organising multidisciplinary meetings (Lu et al., 2020). The results of these studies are significantly higher overall survival rate, shorter hospital stay, less complications, and better disease-specific clinical outcomes. In addition to the outcomes reported above, two studies present mixed results regarding hospitalisation costs (Rui et al., 2019; Xue et al., 2019), and two other studies find no significant changes in mortality rate (Rui et al., 2019; S. Zhang et al., 2019). Moreover, four out of the eighteen studies only summarise the outcomes after the (re)design, without controls (W. (Wei) Li et al., 2019; W. (Weiqin) Li et al., 2009; D. Wu & Y. Chen, 2016; M. Zhao et al., 2014).

Of the remaining two studies, one clarifies roles and responsibilities of a non-MDT (Zhu et al., 2018) and reports significantly higher nursing quality and patients' satisfaction. The other study optimises the working procedures of medical teams via a novel team performance appraisal system (Xiao et al., 2015). Per capita performance and healthcare professionals' satisfaction are significantly higher, but the overall patients' satisfaction is significantly lower in the experiment group compared to those in the control group.

*Programme*

A fixed component of programmes is (re)design, which is combined with training, a tool or both. MDTs are also involved in 7 out of the 16 studies on programme (H. Chen et al., 2011; Q. Chen et al., 2019; Di et al., 2017; Y. Jiang et al., 2015; C. Wang et al., 2019; Yue et al., 2019; X. Zhou et al., 2019). Nine studies combine (re)design with training on technical skills (inputs) (H. Chen et al., 2011; Q. Chen et al., 2019; Di et al., 2017; Kong et al., 2016; Q. (Qin) Liu & Wan, 2015; Shang, 2019; Xing et al., 2013; Xiong et al., 2015; X. Xu et al., 2017). The outcomes are significantly higher patients' satisfaction, nursing quality and working efficiency and lower incidence of medical errors. Notable, two studies show lower incidence of complications and higher work efficiency, without testing significance

(Xing et al., 2013; X. Xu et al., 2017). Four studies evaluate programmes that combine (re) design with rounds (Y. Jiang et al., 2015; C. Wang et al., 2019; Yue et al., 2019; X. Zhou et al., 2019), a structured tool referring to a group of healthcare professionals meeting around a patient to discuss the patient's condition (Buljac-Samardzic et al., 2020). Three out of these four studies present significantly lower incidence of complication and hospital stay and decreased depression scores (Y. Jiang et al., 2015; C. Wang et al., 2019; Yue et al., 2019), while one study only summarises the results (X. Zhou et al., 2019). Lastly, three studies introduce programmes in which all the three types of interventions are combined for postoperative care (W. Xu et al., 2019; J. Yang & J. Zhang, 2016) or cancer pain care (L. Wu, 2015). One study reports a reduction in complications and no significant change in recovery time (W. Xu et al., 2019). Another study shows significant pain reduction (L. Wu, 2015), while the third study reports a sustainable significantly increase in the teamwork score (J. Yang & J. Zhang, 2016).

## DISCUSSION

This systematic review presents an overview of research on teamwork in Chinese hospitals. We first summarise the findings of the relationships among the three teamwork components (i.e. inputs, processes and outcomes) and then list the evidence on interventions to improve teamwork and achieve better team outcomes. As more than 70% of the studies were conducted in tertiary hospitals and nearly all the studied hospitals are in urban areas, the evidence base on primary and secondary hospitals and hospitals in rural areas is very limited.

More than half of the studies that research teamwork components focus on the relationship between inputs (e.g. age, gender, profession, education level and department) and processes (e.g. teamwork within units, teamwork across units and teamwork climate). This relationship has received little attention in Western literature so far (Lemieux-Charles & McGuire, 2006; Schmutz et al., 2019).

Despite the relatively large number of studies on the input-process relationship included in our review, the evidence synthesis is inhibited by the heterogeneity of variables used, the mixed results and the primary research goals that are not focused on this relationship. The only conclusive evidence that can be synthesised from the review findings is that females perceived better team processes (i.e. communication openness, teamwork within units, teamwork climate and team interaction) than males. This may be explained by the differences in personality traits between females and males. Females have been reported to be more agreeable than males, which means that females are more willing

to cooperate and maintain harmony (Costa Jr et al., 2001; Weisberg et al., 2011). The evidence on the relationships between other inputs and processes is inconclusive.

Six studies research the input-outcome relationships, process-outcome relationships or both (W. He et al., 2014; S. Hong & Q. Li, 2017; J. Liu et al., 2010; P. Liu et al., 2018; X. Liu et al., 2020; W. Song et al., 2019). These studies, however, focus on different input, process and outcome variables, which makes it difficult to synthesise the results across studies. One study shows a positive correlation between disciplinary diversity (input) and the number of team consultations (outcome) (X. Liu et al., 2020). Another study shows that better team interaction as a process variable (e.g. communication, coordination and cohesion) is associated with less burn-out (outcome), suggesting a positive influence of team interaction on team performance (W. Song et al., 2019). These results are in line with Lemieux-Charles and McGuire's review (2006) that most of the inputs (e.g. disciplinary diversity) and processes (e.g. communication, coordination and cohesion) have positive correlations with team outcomes. Altogether, however, the evidence on the input-outcome and process-outcome relationships is still scarce. More studies are needed to strengthen the evidence on the relationships of outcomes with processes and inputs.

The studied trainings and tools correspond to those mentioned in Western literature (Buljac-Samardzic et al., 2020). The three studies on efficiency all present evidence of improvement (Y. Hong & Cai, 2018; Qian et al., 2016; Wen et al., 2017). Moreover, two studies on SBAR report higher patients' satisfaction (Wen et al., 2017; X. Yang et al., 2019), and two studies report improved technical skills as an effect of training (X. Xie et al., 2011; L. (Lu-Feng) Zhang et al., 2018). These results are in line with the findings of Buljac-Samardzic et al. (2020) that most trainings and tools result in improvements in team performance. However, the evidence base on training and tools identified in our review is still small.

As was the case for the studies on team components, many team intervention studies regard multidisciplinary teams. The World Bank and the World Health Organization have recommended forming MDTs to promote people-centred integrated care and the quality of care, both of which play important roles in the Chinese health reforms (World Bank & World Health Organization, 2019). Correspondingly, there has been much research emphasis on MDT implementation in Chinese hospitals, which contrasts with the findings of Buljac-Samardzic et al.'s review (2020) on team interventions. We find consistent evidence that MDTs are associated with reduced complication rates and length of hospital stays, and improved efficiency and diagnostic accuracy (Q. Chen et al., 2019; Y. Chen et al., 2018; Di et al., 2017; Y. Jiang et al., 2015; Luo et al., 2019; Rui et al., 2019; J. Wang & Guo, 2018; C. Wang et al., 2019; X. Wu et al., 2019). Nine of the

MDT studies present better disease-specific clinical outcomes for different conditions (H. Chen et al., 2011; Du et al., 2011; Z. He et al., 2014; Q. (Qiangui) Liu et al., 2009; Luo et al., 2019; Xue et al., 2019; Ye et al., 2012; Yue et al., 2019; L. (Le) Zhang et al., 2019). These findings support the positive effects of MDTs, which is in line with the findings of Western MDT studies (Gentene et al., 2021; Ju et al., 2020).

The evidence on the effects of MDT implementation on survival is inconclusive. Three studies report higher survival rates (Du et al., 2011; Lu et al., 2020d; Ye et al., 2012), while two other studies find no significant change in mortality rates after MDT implementation (Rui et al., 2019; S. Zhang et al., 2019). This inconclusive finding may be explained by the different severity, treatment and prognosis of the diseases researched in these studies.

Kirkpatrick (n.d.) divides the team training evaluation into four levels: reactions (e.g. people's reactions and feedbacks to the intervention), learning (e.g. knowledge and skills learnt), behaviour (e.g. participants' behavioural change at work) and results (e.g. patient outcomes and organisational outcomes). Based on these four levels, the majority of the included intervention studies in our review focus on patient outcomes which belong to the fourth level (i.e. results). However, studies in Western reviews commonly regard the first three levels (i.e. reactions, learning and behaviour) and organisational outcomes which are a part of the fourth level (Buljac-Samardzic et al., 2020). This difference may be due to the different research aims of Chinese and Western studies and different research interests of researchers from China and Western countries.

Advocating harmony and collectivism are typical Chinese cultural values, which differ from Western countries (Hofstede Insights, n.d.; Meyer, 2014). Three studies comparing the results between China and the US show higher scores on "teamwork within units" in Chinese hospitals but mixed results on "teamwork across units" and "communication openness" (Nie et al., 2013; X. Xu et al., 2018; Zhong et al., 2019), proposing the value attached to the harmony in the Chinese culture as an explanation. Another Chinese cultural trait, collectivism, is reported to promote mutual support (Hai-ping et al., 2020). These findings and inferences form first evidence on teamwork in China in relation to cultural differences with Western countries.

### *Limitations*

This review has several limitations. Firstly, books and grey literature were not included. Secondly, the translation of the query from English to Chinese may have led to missing results in Chinese databases. With the assistance of a Chinese librarian, the two queries have been made as equivalent as possible. Thirdly, because of publication bias, intervention studies which have not produced desired results may have been

underreported. Finally, although we assessed the methodological quality, the included studies are heterogenous, making it difficult to synthesise the evidence. This limits the certainty of evidence of our findings.

### *Implications for future research*

Firstly, patient outcomes have been predominant in the teamwork research in China, while important team outcomes such as healthcare professionals' satisfaction and well-being have received little attention. The team outcomes deserve future research to advance the evidence base on team performance, as is conducive to designing, selecting and assessing team interventions.

Secondly, the evidence base on the relationships among the three teamwork components deserves strengthening. The included studies seldom aim to investigate these relationships, causing the evidence on the relationships among inputs, processes and outcomes to be largely inconclusive. More appropriately designed studies addressing these relationships are called for, as they will also promote the understanding of interventions on inputs (e.g. the introduction of MDTs) related to processes and subsequently to organisational outcomes and patient outcomes.

Lastly, it is important to recognise that China is a large country with considerably variety across provinces (Kwon, 2012). The impact of this variety of contexts (e.g. different cultures) on teamwork and team performance is largely unexplored. Most studies are from tertiary hospitals in urban China. Due to the contextual differences, it cannot be assumed that this evidence has validity in lower-level hospitals and rural areas. In view of the priority attached to improving primary care and rural healthcare in the Chinese health reform (L. Li & Fu, 2017), valid evidence for primary hospitals and rural China is urgently called for.

## CONCLUSION

The Chinese studies on teamwork components mainly focus on the input-process relationship. The evidence provided on this relationship is, however, mostly inconclusive. The intervention studies in Chinese hospitals predominantly focus on patient outcomes rather than organisational and employee outcomes. The introduction of training, tools and MDTs generally shows promising results. The evidence from primary hospitals and rural areas, which are prioritised in the health reforms, is especially scarce. Advancing the evidence base on teamwork, especially in primary hospitals and rural areas, is needed and can inform policy and management to promote the health reform implementation.

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# 3

# Factors and interventions determining the functioning of health care teams in county-level hospitals in less affluent areas of China: A qualitative study

Wang, H., van Wijngaarden, J., Buljac-Samardzic, M., & van de Klundert, J. (2023). Factors and interventions determining the functioning of health care teams in county-level hospitals in less affluent areas of China? A qualitative study. *Frontiers in Public Health*, *11*, 1082070.

## ABSTRACT

**Introduction:** Teamwork is essential for the quality and safety of care, and research on teamwork in healthcare has developed rapidly in many countries. However, evidence from less affluent, non-Western countries is scarce, while improving teamwork may be especially relevant to be able to increase the quality of care in these settings. This study aims to understand the main factors that influence, and interventions used to improve, the functioning of healthcare teams in the context of county-level hospitals in less affluent areas of China.

**Methods:** We conducted semistructured interviews to explore the factors that influence team functioning and the interventions implemented to improve team functioning in these hospitals. 15 hospital presidents and 15 team leaders were selected as respondents.

**Results:** From the interviews, we have identified five main factors that influence team functioning in these hospitals: "stuck in the middle", local county setting, difficulty in attracting and retaining talent, strong focus on task design and strong focus on leadership. The interventions for improving team functioning can mostly be categorised as the following: 1) measures to attract and retain talent (e.g. increase salary, train talent in national or provincial level hospitals, and provide fast-track promotions); 2) interventions focused on monodisciplinary teams (e.g. changing the team structure and leadership and skill training); and 3) interventions to establish and improve multidisciplinary teams (e.g. simulation training and continuous team process improvements).

**Conclusion:** With the introduction of multidisciplinary teams, interventions into team processes have started to receive more attention. The findings depict an overview of the main factors and interventions as specifically relevant for team functioning in county-level hospitals in less affluent areas of China and may help these hospitals benefit from additional process interventions to improve teamwork and the quality of care.

**Key words**: teamwork, team functioning, team interventions, leadership, multi-disciplinary team, county-level hospitals, less affluent areas, China

## INTRODUCTION

Healthcare is a highly demanding industry, which requires effective teamwork to provide high-quality care for patients. The landmark publication "To err is human" has pointed out the key role of teamwork in reducing medical errors (Kohn et al., 2000). Since then, the evidence base supporting the impact of teamwork on the quality and safety of care has continued to grow. Manser's review (2009) confirms that teamwork plays a key role in preventing adverse events. Schmutz et al.'s systematic review (2019) and meta-analysis more generally shows that teamwork is positively related to the clinical performance of healthcare teams.

Due to the importance of teamwork in the quality and safety of care, research on the functioning of healthcare teams has been blooming in recent decades. Lemieux-Charles & McGuire (2006) have proposed the Integrated (Health Care) Team Effectiveness Model (ITEM) to describe the relationships among team inputs (i.e. social and policy context, organisational context and task design), processes and outcomes. This model is the foundation and starting point of many teamwork studies in healthcare. Other researchers have focused on interventions to improve team functioning in healthcare. For example, Buljac-Samardzic et al. (2020) have proposed four categories of such interventions in healthcare: training, tools, (re)design and combinations of interventions from multiple categories. McCulloch et al. (2011) have reviewed the effects of teamwork training on healthcare professionals' performance and found enhanced teamwork after training, as well as improved staff attitudes and efficiency and reductions in medical errors.

The existing evidence on teamwork in healthcare is, however, mostly from Western countries. Evidence from less affluent, non-Western contexts is especially lacking. This can be viewed as problematic in contexts such as less affluent Chinese areas, as the World Bank and the World Health Organization have advocated enhancing teamwork in Chinese hospitals as one of the strategies to improve the quality of care delivered by Chinese hospitals (World Bank & World Health Organization, 2019). This calls for research to increase the evidence base and close the knowledge base by exploring the functioning of healthcare teams and the interventions for improving team functioning in these hospitals, which may also be relevant for other less affluent, non-Western areas in the world.

A recent review of the evidence on teamwork in Chinese hospitals finds that most of the included studies were conducted in national and provincial level hospitals and that the evidence base for county-level hospitals and primary care institutions is scarce (Wang et al., 2021). The 17,294 county-level hospitals play a pivotal role in the Chinese

health system (National Health Commission, 2022). Positioned between primary care institutions on the one hand and national and provincial level hospitals on the other hand, they are required to provide an extensive variety of health services for the population of more than 498 million living in counties and county-level cities (National Bureau of Statistics of China, 2022).

Governmental authorities and populations of counties and county-level cities in less affluent areas of China often face resource shortages that can negatively impact the health services delivery infrastructure, particularly for county-level hospitals. Thus, county-level hospitals in less affluent areas face unique context-specific challenges. The validity of existing evidence on teamwork in China's national and provincial level hospitals in affluent areas may, therefore, be limited for this context. In this study, we aim to extend the understanding of team functioning and team interventions in these hospitals. More specifically, we propose the following two research questions:

(1) What are the main factors that influence the functioning of healthcare teams in county-level hospitals in less affluent areas of China?

(2) What interventions have been implemented by county-level hospitals in less affluent areas of China to improve the functioning of healthcare teams?

## MATERIALS AND METHODS

### *Research Method*

The ITEM shows that social and policy context plays an indispensable role in team functioning, as is further emphasised by the Context-Interventions-Mechanisms-Outcome logic that explicitly captures the role of context in understanding the effects of interventions on outcomes (Denyer et al., 2008; Lemieux-Charles & McGuire, 2006). Because of the scarce evidence on team functioning and team interventions in the context at hand, i.e. county-level hospitals in less affluent areas of China, and the limited validity of existing evidence in this unique context, it is necessary to construct our understanding of factors influencing team functioning and interventions to improve functioning specifically in this context rather than assuming that the known factors from research are valid. Therefore, our study is of explorative, phenomenological nature, following the constructivist paradigm and using semistructured interviews for data collection (Giorgi, 2005; Rabionet, 2011; Rahi, 2017)(12-14). The reporting of this study follows the Standards for Reporting Qualitative Research (SRQR) guideline (O'Brien et al., 2014).

This study was approved by the Research Ethics Review Committee of Erasmus School of Health Policy and Management, Erasmus University Rotterdam (Approval No. 21-035). Oral informed consent was obtained from all the participants before the data collection.

### *Interview Topics*

The interviews have two parts. The first part addresses the factors that influence team functioning, and the second part considers the interventions implemented to improve team functioning. Each part includes both general, open-ended questions and more structured questions based on a list of topics extracted from the literature. The interview guide is presented in Appendix 3.

The topic list for the first part is rooted in an input-process-outcome-based teamwork model as also adopted in the aforementioned ITEM which forms the corresponding theoretical framework (Dietz et al., 2014; Korner et al., 2016; Lemieux-Charles & McGuire, 2006). Within this framework, we specifically consider the "social and organisational context" and address the specificities of the less affluent county settings and China's ongoing national health reforms.

Team composition and individual characteristics are important team inputs that are well researched in China but not for county-level hospitals (Wang et al., 2021). These inputs, therefore, need to be explicitly addressed. The Chinese culture emphasises the hierarchy in organisations (Hofstede Insights, n.d.; Meyer, 2014), which implies that "leadership" is an important teamwork input and process worthy of special attention. Finally, we are especially interested in exploring team processes, as they have thus far received little attention in Chinese health services research on teamwork (Wang et al., 2021).

The topic list for team interventions studied in part two contains the aforementioned categories "training", "tools" and "(re)design" (Buljac-Samardzic et al., 2020). Furthermore, as the Chinese government promotes the development of multidisciplinary teams (MDTs) and requires county-level, provincial level, and national level hospitals to establish MDTs, MDTs receive special attention within the category "(re)design" (National Health Commission & National Administration of Traditional Chinese Medicine, 2018).

### *Inclusion Criteria and Sampling*

We consider a hospital to be a county-level hospital if it is located in a county or in a county-level city in China. We consider a county or county-level city to be less affluent if its GDP per capita level was below the national average in 2020, i.e. 72,447 Chinese Yuan (10,154 US Dollars) (National Bureau of Statistics of China, 2021). We initially selected 15 county-level hospitals from areas thus identified as less affluent by purposive

convenience sampling with the aid of the Health Human Resources Development Centre of the National Health Commission of China and the Health County Media (Etikan et al., 2016). The research team has no direct connections with these studied hospitals. In addition, the first author is from China and has worked as a healthcare professional in China for several years, so he well knows the Chinese health system and the context of this study, which will be helpful for conducting the study and analysing data.

From each county-level hospital, we intended to interview the hospital president and one team leader who was in turn proposed by hospital senior management. The reason for enrolling hospital presidents and team leaders is that they, as both healthcare professionals and managerial personnels, most clearly know the influence of the unique context (i.e. county-level hospitals in less affluent areas of China) on team functioning and will provide the most valuable perspectives for this study. Data saturation determined the final sample size as we checked for saturation (i.e. all relevant themes were identified, and the same themes repeatedly emerged.) after conducting interviews with the respondents from hospitals in the initial set (Fusch & Ness, 2015; Guest et al., 2006).

### *Data Collection*

Ultimately, 30 interviews were conducted via WeChat voice calls between September and December 2021. These interviews lasted from 38 minutes to 79 minutes and were recorded for further analysis. The first author transcribed all the audio-recordings in Chinese, translated 5 Chinese transcripts into English to be used for the independent coding process and alignment of the codes between the first and second author and pseudonymised them to protect participants' privacy.

### *Data Analysis*

A thematic analysis was conducted via the software Atlas.ti and Microsoft Excel to generate codes and themes (Lochmiller, 2021). The data analysis is characterised by a combination of an inductive and deductive approach (Azungah, 2018; Thomas, 2006). The first and second authors independently analysed and coded the English transcripts. While the interview questions were partly based on theory, we primarily used open coding in the data analysis (following an inductive approach). During the coding process, the first and second authors first familiarised themselves with the transcripts and created preliminary codes. Thus, these codes primarily emerged inductively from our data. Further synthesis of the codes also adopted a deductive approach when interpreting and reflecting from the perspectives of the theories used to generate the interview guide (Buljac-Samardzic et al., 2020; Dietz et al., 2014; Korner et al., 2016; Lemieux-Charles & McGuire, 2006).

After the preliminary coding process was finished, the first and second authors compared and discussed dissimilarities in their independent codes until consensus was reached. Then, the first author continued analysing and coding the remaining Chinese transcripts based on the preliminary codes. After the coding for all transcripts was completed, discussion took place again between the first and second authors to resolve any issues with the codes. Next, themes were derived from these revised codes and subsequently merged into several overarching themes. These overarching themes were discussed and revised multiple times among all the authors in the process of data synthesis and developing the results section until consensus was reached. This triangulation of researchers ensures the rigour, credibility, and reliability of the study.

## RESULTS

The data obtained during part one of the interviews, which addresses the first research question, yielded five main factors that influence team functioning in county-level hospitals in less affluent areas of China. These main factors are "stuck in the middle", local county setting, difficulty in attracting and retaining talent, strong focus on task design and strong focus on leadership. The results for part two which addresses the second research question on team interventions are presented subsequently. The overview of the results is shown in Figure 1. Dash lines and arrows indicate the connection between the ITEM and the findings of this study.

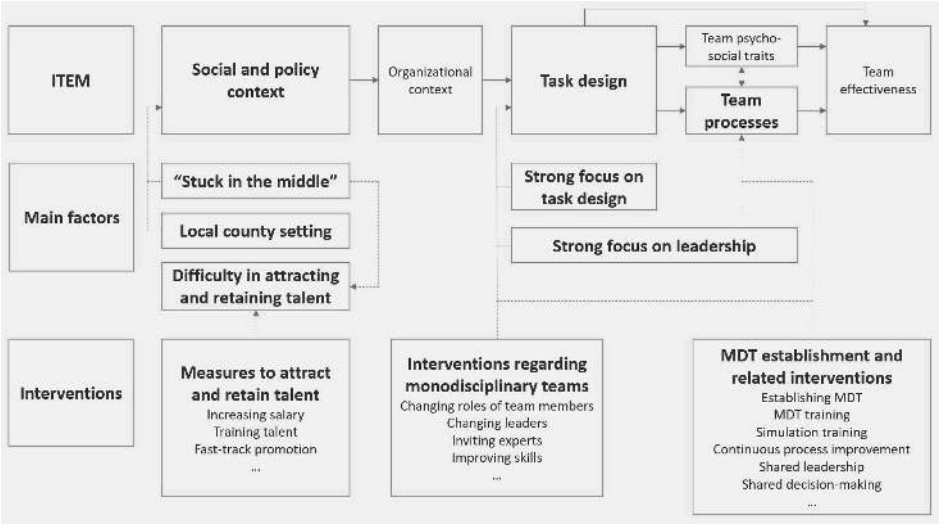


Figure 1. Overview of the results.

## *The Main Factors that Influence Team Functioning*

### *"Stuck in the Middle"*

From the interviews, we learn that county-level hospitals are viewed as "stuck in the middle" between primary care institutions on the one hand and national and provincial level hospitals on the other hand. Primary care is seen as the main point of access for patients with mild diseases, whereas patients with more severe and complex conditions prefer to visit national or provincial level hospitals. County-level hospitals are, however, expected to contribute to servicing both types of patients, which puts them in a difficult position.

*"There is a very important responsibility for county-level hospitals. We have to treat not only common and frequently occurring diseases but also emergency cases and critically ill patients."*

Moreover, the reputation of county-level hospitals is perceived as poor, which further exacerbates the difficulties in attracting patients and continuing providing health services for severe and complex patients.

*"Many patients who are critically ill, such as with cancer, have been more willing to visit national or provincial level hospitals instead of staying here."*

As a consequence, healthcare professionals in county-level hospitals have few opportunities to practice all of their discipline-specific clinical skills, which makes it hard to maintain or improve the abilities of healthcare teams to provide appropriate care for complex cases.

*"Patients, such as those with tumours, will go to the hospitals in the prefecture-level city or even Beijing and Tianjin when they are diagnosed with tumours. You cannot retain such patients, so it is difficult to improve the clinical skills of the team."*

Another consequence brought by the poor reputation of county-level hospitals is the lack of revenue. As county-level hospitals mainly earn their income by providing patient care, their poor reputation may negatively impact patient volumes and subsequently available financial resources. This inhibits these hospitals from buying necessary equipment for health services and can negatively impact the salary budget. When this translates into lower salaries, fewer professionals or both, it can in turn negatively impact team functioning, health services provisioning, hospital reputation and income, causing these hospitals to feel even more stuck.

*"The insufficiency of funding is very normal. …… First, …… you cannot carry out some health services without necessary equipment, so you are not able to treat patients. Another thing is the motivation and incentives. …… If you cannot provide enough salary, staff are not able to work well as they need to live and support their families."*

***Local County Setting***

Our respondents tell us that county-level hospitals are located in specific local county settings. These areas are typically more mono-cultural than China's big cities and have their local customs, norms, values and dialects. Furthermore, (close) interpersonal relationships are likely to exist outside of work among staff of county-level hospitals because counties and county-level cities are relatively small. The shared cultural background and social relations facilitate communication and teamwork, according to the respondents.

*"A good thing is that this is a small place, so everyone is familiar with each other. There are many social relationships behind us. ….. Therefore, various communication modes exist in a team."*

However, these local county characteristics can cause integration difficulties for nonlocals, as they may have different working habits or struggle to understand the local

dialect. Rather than creating an open environment for "outsiders", county-level hospitals are often prone to recruiting local professionals.

*"We mainly recruit local employees whose families and social relationships are in our county. These employees can adapt well to our local culture and customs. Outsiders really do not fit in."*

***Difficulty in Attracting and Retaining Talent***

As a result of the two aforementioned factors, most county-level hospitals have experienced difficulties in attracting and retaining talent. Talented professionals are reported to be likely to leave as they find it difficult to improve their clinical skills due to the lack of complex cases. The aforementioned limitations in salary budgets may further add to these challenges and cause talented professionals to seek alternative employment elsewhere.

*"There are not many patients for some disciplines, for instance, paediatrics and oncology. Then, it is hard to improve the clinical skills. The salary is also low. Therefore, they will resign."*

Moreover, the less affluent character of the county context has further exacerbated the talent insufficiency beyond the aforementioned salary limitations.

*"Then, the living condition is also a key consideration, for example, children's education. Nearly all the aspects here are worse than those in big cities."*

In this case, the lack and loss of talent hinder the influx of new knowledge and skills into the healthcare teams in county-level hospitals, which in turn impedes effective communication between team members.

*"If the degree level of a team is too low, the acquisition and renewal of the state-of-the-art medical knowledge is limited. This will hinder the communication within a team as no one understands the latest knowledge."*

To change this situation, county-level hospitals have taken measures in recent years to recruit young talent. (The specific measures will be discussed later when reporting interventions.) As a consequence, an increasing number of young healthcare professionals appear in county healthcare teams, increasing intergenerational interactions with both positive and negative consequences.

Different respondents stress the harmony and energy that young healthcare professionals bring to the teams, which increases the vitality within teams and is beneficial for the interaction between these team members.

*"Most of the team members are young. They are energetic. The atmosphere within the team is harmonious. Therefore, it is easy to arouse their enthusiasm for work."*

Some older doctors are willing to teach and support their young colleagues, improving their clinical skills and the cohesion and communication within teams.

*"Young doctors are less experienced. Then, the older doctors teach them. ….. This is the mode of teaching and helping. Everyone feels happy to work on the team. The whole team is also harmonious."*

However, not all older doctors are cooperative. Some feel threatened by these young professionals and refuse to share their knowledge and support their younger colleagues. As a result, these young healthcare professionals may experience difficulties integrating and be more likely to leave.

*"A team recruited a professional with a high degree. The older staff on the team felt threatened and did not support the professional's work. This young talent found himself unable to use his knowledge there, so he finally left."*

***Strong Focus on Task Design***

From the interviews, we learn that most healthcare teams in county-level hospitals are monodisciplinary and adopt a monodisciplinary basis for the task design within the teams.

Our respondents especially emphasise the importance of disciplinary clinical skills, team composition and role clarity with respect to task design. Moreover, most respondents believe that clinical skills positively impact team performance.

*"It is sure that if the healthcare professionals' clinical skills are better, this team will function better."*

An appropriate team composition, for example regarding educational background and seniority, is perceived to be beneficial for team functioning by most respondents as every healthcare professional in the team is seen to have a well described specific role.

*"The team composition is very important. The ideal status is that old, middle-aged and young staff should all be involved in a team. …… It is very helpful for team functioning."*

***Strong Focus on Leadership***

In addition to the importance of task design elements, most respondents also stress the pivotal role of leadership in team functioning. Team leaders must be regarded as leading experts in their field, with excellent clinical skills, for a team to function well.

*"As a team leader, he or she must be a leading expert of the discipline. Namely, his or her clinical skills are very good. If every decision and each step arranged by the team leader is reasonable, the team members will firmly support his or her leadership."*

Furthermore, team leaders' individual characteristics and leadership skills are seen as crucial to ensure high-quality team functioning.

*"First, a team leader should have foresight; otherwise, the team planning will be influenced. Second, he or she needs to possess executive ability. ….. Third, a team leader must be fair, or the team will not be cohesive. Fourth, decisiveness, which is part of decision-making, is needed for a team leader."*

In addition, some of the respondents mention the crucial role of hospital management in team functioning. They not only monitor team functioning but are also involved in resolving operational issues and in introducing interventions.

"*The hospital administrators usually visit each healthcare team. …… Staff can report issues to the hospital president via WeChat or telephone. Then, these issues will be solved."*

Despite the importance of a clear hierarchy and strong leadership, most of the respondents do not think there is a substantial power distance within teams in county-level hospitals. This relates to the shared backgrounds and social ties between the team members.

*"Although the team leaders have some power and managerial ability, the power distance in our area is not that high. All the team leaders get along with team members in real daily life, so there is no barrier to the communication between team leaders and team members."*

In particular, young leaders are seen as more open-minded and willing to listen to others.

*"The team leader and the doctors on the team are young, so there is no barrier to the communication between us. …… When team members raise the issues they find, it helps the team develop or even helps the team leader better manage the team. We need to adopt their good suggestions."*

Furthermore, a few respondents even state that managerial delegation is encouraged and supported by team leaders and seen as beneficial for team functioning.

*"A good team is a team on which everyone participates in management under the supervision of the team leader. ……We have taken some measures, for example, assigning some administrators for quality control, nosocomial infection control and team operation. These people can help the team leader better manage the team. …… On some specific things, team leaders do not know better than the team members."*

### *Interventions for Improving Team Functioning*

County-level hospitals have implemented different interventions to improve team functioning as addressed in the second part of the interviews. These interventions can be synthesised into three categories: measures to attract and retain talent, interventions mainly focused on monodisciplinary teams and interventions to establish and improve MDTs.

#### *Measures to Attract and Retain Talent*

Facing the difficulty of attracting and retaining talent, most county-level hospitals have taken measures to reverse this situation. These measures include increasing talent salaries, sending staff to learn clinical knowledge and practice their clinical skills in national or provincial level hospitals, and promoting them to a higher professional title or managerial position at an early stage. Together, these interventions are intended to make county-level hospitals more attractive for recent university graduates.

*"If this young recruit is full of positive energy and good at every aspect of his or her job, we will promote him or her to a managerial position to stimulate his or her enthusiasm for work and let him or her see the hope to work here."*

Interestingly, one of the hospitals in our study has introduced a form of unified personnel management to attract talent from primary care institutions. Well-performing professionals from primary care institutions have the chance to be promoted to this county-level hospital while at the same time poorly performing professionals from the county-level hospital are considered to be reemployed in primary care. This human resource management practice is perceived as effective.

*"Staff from primary care institutions can compete for the opportunity to work in our hospital. …… This mode gives these staff the hope to work in better hospitals and improve their quality of life. Meanwhile, the staff in our hospital feel a sense of crisis. If they do not work well, it is also possible for them to work in primary care institutions."*

Respondents have not been able to present evidence (beyond anecdotal evidence) on the effectiveness of any of the interventions to recruit qualified staff and mitigate their willingness to leave.

***Interventions Regarding Monodisciplinary Teams***

County-level hospitals display a preference for interventions on task design, in particular for leaders, to improve the performance of monodisciplinary teams. These interventions, for instance, include changing the roles of team members, changing leaders and inviting experts from national or provincial level hospitals. In addition, interventions include the improvement of task related skills such as clinical skills and managerial skills.

*"If a team leader cannot help the team function well, …… we will change the team leader. …... We have successful examples. Some teams have obviously functioned much better after we changed their team leaders."*

*"We usually organise training around clinical skills. For instance, cardio-pulmonary resuscitation, ……, and emergency tracheal intubation. …… It is very effective."*

***Multidisciplinary Team (MDT) Establishment and Related Interventions***

County-level hospitals have come to realise that the conventional monodisciplinary setting does not meet the demands of the increasing volumes of patients with complex, critical, conditions. These multimorbid conditions especially need the expertise of multiple specialties. Furthermore, the Chinese national health reforms stipulate that county-level hospitals have to establish MDTs to improve the quality of care for emergency patients and critically ill patients by introducing five MDT centres, i.e. chest pain centre, stroke centre, trauma centre, critically ill maternal treatment centre, and critically ill neonatal treatment centre (National Health Commission & National Administration of Traditional Chinese Medicine, 2018). County-level hospitals have taken up the establishment of MDTs for these centres to improve the consultation for complex cases (e.g. oncological patients) and to ensure integrated care for common conditions that require the involvement of multiple specialties (e.g. diabetes and hypertension).

As was the case for the monodisciplinary teams, task design elements regarding clinical skills, team composition and hierarchy are stressed to be of importance for the

functioning of MDTs. For example, multidisciplinary consultation teams often have a fixed composition (i.e. chief physicians and deputy chief physicians) to ensure the quality of consultation. Likewise, the leader of the core discipline of an MDT centre reportedly always leads the multidisciplinary collaboration within the centre. In multidisciplinary consultation teams, the most experienced doctor is typically appointed to lead and integrate the views of the team members from various disciplines.

*"Take the chest pain centre as an example. The main discipline of this centre is cardiology. The leader of cardiology, who is also the leader of the chest pain centre, is responsible for arranging everyone's work within the team. Other team members are in a cooperative position and should follow the team leader's arrangement."*

Experts from national or provincial level hospitals may be invited to help make final decisions when the team leader is not able to deal with divergent opinions within the MDT due to the limited knowledge and clinical skills in county-level hospitals.

The newly built MDTs also bring new challenges for teamwork, especially regarding collaboration. For instance, some healthcare professionals are reluctant to work with those from other disciplines. Therefore, in some of these cases, county-level hospitals have organised training to increase staff awareness of MDT collaboration.

*"These doctors and nurses have received specialised MDT training. Their thinking is unified, and they have awareness of MDT collaboration."*

The multidisciplinary collaboration difficulties have caused hospital management to initiate interventions targeting the improvement of team processes (e.g. communication, collaboration and coordination) rather than intervening in task design. Simulation training is frequently reported with the purpose of promoting the coordination and collaboration within MDTs. Most respondents perceived teamwork improvements from simulation training.

*"After the operation of the MDT and simulation, the communication and coordination between disciplines improved. …… Another thing is that doctors' and nurses' clinical skills have also improved. …… Now, they also have knowledge of other disciplines; their capabilities in their basic clinical work to treat patients have improved."*

Furthermore, there were reports that hospital management implemented continuous improvement of MDT processes after simulation training and the initial implementation

of MDTs. Shared leadership and decision-making are seen to contribute to such process improvement.

*"This is a process of gradual optimisation. After the MDT collaboration, …… we usually discuss the existing issues. Everyone expresses their opinions on how to optimise the procedures and workflows, how to save time and how to improve efficiency. This is what we are continually improving."*

## DISCUSSION

In this study, we aim to understand the main factors that influence team functioning and the interventions implemented to improve team functioning in county-level hospitals in less affluent areas of China.

These main factors are covered below following the logic of the synthesis presented in the results section. For each of the factors, we additionally discuss whether they can be viewed as facilitators, barriers or both. The main interventions and their associated barriers are discussed next.

Respondents' views on the factors regarding the contextual setting of the studied hospitals (i.e. the intermediate position in the Chinese health system and the local county setting) indicate that the contextual setting may bring both barriers and facilitators.

The context-specific barriers mostly relate to resource shortages such as staff shortages, lack of equipment and insufficient funding. These resource shortages have been reported for hospitals in other low-income and middle-income countries and are seen as a barrier to healthcare delivery (Grimes, et al., 2011; Lehmann et al., 2008; Saraceno, et al., 2007). Personnel shortages are also reported in rural areas in high-income countries (Weinhold & Gurtner, 2014; World Health Organization, 2018). Our results confirm that these context-related resource shortages may negatively impact healthcare delivery and additionally show that they may exacerbate the personnel and financial shortages. Moreover, the relatively poor living conditions provided by the less affluent settings can cause young staff to leave. All these barriers negatively influence team functioning in county-level hospitals and can cause them to be stuck even deeper between primary care and provincial and national level hospitals.

At the same time, our results reveal that the local county setting can facilitate team functioning in county-level hospitals due to the strong sense of community and shared

local culture and values. This confirms previous evidence from rural areas in other countries (Roussi, et al., 2006; Warburton & Winterton, 2017). These local idiosyncrasies can enhance the communication between local team members in county-level hospitals. However, we also find that local culture and values can turn into a barrier when "outsiders" may perceive it as difficult to integrate and subsequently are more likely to leave.

From the findings, we know that Chinese county-level hospitals have implemented various interventions to overcome these barriers. Fast-track promotion (i.e. promoting talent to a higher professional title or managerial position at an early stage) aims to attract and retain talent as it provides a faster career path in comparison to national and provincial level hospitals. The resulting influx of young talent may bring intergenerational differences to healthcare teams. The emergence of these differences was found to be a barrier and a facilitator, depending on the attitudes of older healthcare professionals toward their younger colleagues. We present suggestions for overcoming intergenerational barriers below when discussing interventions into team processes.

The medical treatment alliance initiated by the Chinese authorities helps county-level hospitals overcome resource shortages and improve team functioning by training staff in national or provincial level hospitals and inviting experts to support county-level hospitals (General Office of the State Council, 2017). Our respondents provide little evidence on the effectiveness of such interventions yet, which, therefore, is an interesting area for future research.

The scientific literature provides suggestions for other interventions that thus far appear to have been disregarded. The integration of "outsiders" can, for instance, be promoted by diversity awareness training for team leaders and team-building exercises for team members (Kim, 1999; Shen et al., 2009). Such interventions can more generally contribute to building a cohesive and inclusive organisational and team culture that facilitates attracting and retaining "outsiders" to advance hospital performance.

Our results on team interventions show that county-level hospitals prefer interventions to improve technical skills and interventions in team structure to improve team performance, especially for monodisciplinary teams. A recent systematic review on teamwork in Chinese hospitals also shows a preference for training clinical skills and redesigning team structure (Wang et al., 2021). Based on the ITEM, both technical skills and team structure belong to task design (Lemieux-Charles & McGuire, 2006). It may then be noted that the identified preference to intervene in task design in Chinese county-level hospitals contrasts with the predominant focus of Western hospitals to intervene

in team processes, which more frequently involve simulation training and crew resource management training and use tools for promoting and facilitating communication (Buljac-Samardzic et al., 2020).

One explanation for this difference is that team processes such as communication and collaboration are not perceived to require improvement interventions because of the shared cultural background and close social relationships among team members. Moreover, the "collectivist" values of Chinese organisational culture may naturally facilitate cooperation within teams, thus reducing the (perceived) need to improve processes (Hofstede Insights, n.d.; Meyer, 2014).

Another explanation may lie in the cultural differences between China and Western countries. Chinese culture emphasises hierarchy in organisations (Hofstede Insights, n.d.; Meyer, 2014), which helps clearly define the hierarchy and leadership within teams and subsequent top-down communication. As a result, teamwork problems are preferably resolved by changing the team leader or team structure rather than by intervening in team processes.

Despite the emphasis on task design interventions, team process interventions can still be valuable when issues in team processes appear to be rooted in team structure. For example, interpersonal conflicts may occur due to the intergenerational differences in values, personality and behaviours brought by the influx of young staff, as discussed above (Cahill & Sedrak, 2012; Kupperschmidt, 2000; Swearingen & Liberman, 2004). The literature summarises a number of interventions for relieving such conflicts, for instance, reframing intergenerational differences, organising team building activities, providing equal development opportunities for all generations and facilitating communication by using other generations' language (McGuire et al., 2007; Urick et al., 2017). To avoid and resolve potential intergenerational conflicts within teams, county-level hospitals may learn from these interventions and develop their own tailored interventions.

As the Chinese health reforms are deepening, the Chinese government has promoted "Patient-Centred Care" and advocated the establishment of MDTs in Chinese hospitals to address patients' multimorbidity (National Health Commission & National Administration of Traditional Chinese Medicine, 2018; World Bank & World Health Organization, 2019). Successful implementation of MDTs can promote desired team and patient outcomes, such as increased team innovation capacity, reduced incidence of adverse events and improved staff and patient satisfaction (Epstein, 2014; Fay et al., 2006). Compared to monodisciplinary teams, newly built MDTs were found to exhibit distinct features and confront new barriers for which different (types of) interventions are implemented.

Our findings show the difficulty of collaborating across disciplines surfaces as a main barrier to MDT effectiveness. This difficulty might be rooted in the traditional Chinese value "collectivism", which causes professionals to commit to and behave more cooperatively with the "in-group"—their discipline—and show a corresponding tendency to disregard those outside of the "in-group"—staff from other disciplines (Gomez et al., 2000; Hofstede Insights, n.d.; McAtavey & Nikolovska, 2010; Triandis, 1989)(45-47). Although MDTs are a new "group" gathering healthcare professionals from many disciplines, staff may continue to consider professionals from other disciplines as "out-groups" and thus be reluctant to collaborate with them in MDTs. The literature provides further evidence that language barriers between disciplines and conflicts across disciplines can form barriers to MDT collaboration (Coombs & Ersser, 2004; Govender et al., 2019; Whiteside, 2004).

Our results indicate that these barriers to MDT collaboration have prompted an interest in team processes, and county-level hospitals have started to implement team process interventions to improve MDT functioning. From the findings, we know that Chinese county-level hospitals have organised simulation training to promote the coordination and collaboration within MDTs. Moreover, hospital management has initiated corresponding continuous improvement of MDT processes.

The shared leadership and decision-making in such continuous improvement further strengthens our finding that power distance is perceived to be low in county-level hospitals, which is seen as conducive to effective teamwork by the respondents.

These interventions are broadly in line with the recent international literature on team processes and the positive impact of improving team process elements such as communication, collaboration, coordination and decision-making on the effectiveness of MDTs (Epstein, 2014; Fleissig et al., 2006; Johansson et al., 2010).

Our findings on the main factors that influence team functioning and team interventions in county-level hospitals in less affluent areas of China may be generalised to other less affluent, non-Western contexts. However, as specific Chinese cultural traits appear to be embedded in our findings, the external validity in the aforementioned contexts may be limited.

### *Limitations*

There are some limitations of this study. First, all respondents have managerial roles, and we did not enrol other healthcare professionals. Hence, those professionals' perspectives on team functioning are not included. Second, we selected 15 hospitals

to advance the understanding of team functioning in county-level hospitals in less affluent areas of China. Larger-scale studies can provide a stronger evidence base for team functioning in county-level hospitals. Third, as we did not enrol participants from primary care institutions, national or provincial level hospitals, or hospitals in more affluent areas, it remains unclear to what extent the identified factors and interventions are specific to county-level hospitals in less affluent areas of China. Fourth, this study focused on the main factors and interventions to be particularly relevant for county-level hospitals in less affluent areas of China. Therefore, it does not provide a general analysis of teamwork and team functioning in these hospitals. Last, this study focused on factors and interventions that were commonly reported and has not analysed differences between county-level hospitals, which may therefore be an interesting direction for future research.

## CONCLUSION

The specific contextual features and the focus on task design and leadership influence the functioning of healthcare teams in county-level hospitals in less affluent areas of China. There is a strong preference to intervene in team structure and leadership to improve team functioning. Due to the integration difficulty for “outsiders”, intergenerational interaction and the establishment of MDTs, process interventions are likely of additional benefit for county-level hospitals to improve team functioning and the quality of care. Recent initiatives in this direction are a promising area for practice and scientific research, strengthening the evidence base.

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# 4

# Healthcare workforce strengthening: Does (generational) diversity improve team functioning in rural Chinese hospitals? A cross-sectional study

Wang, H., Buljac-Samardzic, M., van Wijngaarden, J., & van de Klundert, J. Healthcare workforce strengthening: Does (generational) diversity improve team functioning in rural Chinese hospitals? A cross-sectional study. (under review)

## ABSTRACT

**Introduction**: Hospitals in developing countries have begun to increase the recruitment of healthcare workforce which is recommended by the United Nations to achieve universal health coverage. Generational diversity, increasingly prominent in the composition of healthcare workforce in rapidly developing countries, has received much attention in practice and research recently. While research has revealed various positive and negative impacts of generational diversity on team functioning, the understanding of the mechanism explaining how generational diversity influences team functioning is still limited. This study in rural Chinese hospitals examines the relationship between (surface-level) generational diversity and (deep-level) perceived similarity and investigates how they influence three teamwork behaviours that importantly determine quality of care: speaking up, silence and knowledge sharing.

**Methods**: Via an online survey, 841 healthcare professionals from four rural Chinese hospitals gave their views on generational diversity, perceived similarity, speaking up, silence and knowledge sharing. Multilevel mediation hypotheses were tested.

**Results**: Perceived similarity is positively related to the three teamwork behaviours, i.e. speaking up, silence and knowledge sharing, while generational diversity is not. As the relationship between generational diversity and perceived similarity is non-significant, perceived similarity does not mediate the relationship between generational diversity and teamwork behaviour.

**Conclusion**: This study in rural Chinese hospitals confirms the positive relationship between the deep-level perceived similarity, and the three team behaviours speaking up, silence and knowledge sharing, and finds that generational diversity is not significantly related with perceived similarity nor with these three team behaviours. This suggests that increases in generational diversity that results from healthcare workforce strengthening may not impact team behaviours and performance. However, explicit management efforts to mitigate the negative impact on team behaviour and care provision are called for if the healthcare workforce strengthening required for achieving universal health coverage reduces perceived similarity in teams.

**Keywords**: generational diversity, perceived similarity, teamwork, speaking up, silence, knowledge sharing

## INTRODUCTION

Sustainable Development Goal 3 aims at good health and well-being for all and at universal health coverage (UHC) as a subgoal towards achieving this aim (World Health Organization, n.d.). Many developing countries experience barriers to providing high quality care, a key component of UHC, because of healthcare workforce shortages. These shortages are particularly severe in rural and remote areas (Lehmann et al., 2008; Maffioli et al., 2019; Sheikh et al., 2017). Improvement of healthcare workforce management in developing countries, including recruitment, development and retention, can form an effective strategy towards UHC (World Health Organization, n.d.). Attracting and retaining more highly qualified workforce often requires entertaining a greater variety of healthcare professionals, thus increasing the diversity in the workforce and healthcare teams. This diversity may entail a wider variety of generations, professionals and cultural or geographical backgrounds.

Healthcare workforce diversity can impact healthcare team performance both positively (e.g. better health outcomes) and negatively (e.g. increased conflict) (Gomez & Bernet, 2019; Guglielminotti et al., 2022). However, the evidence base is predominantly from developed countries (Gomez & Bernet, 2019; Guglielminotti et al., 2022), leaving the role of workforce diversity in the performance of rural healthcare teams in developing countries where UHC is most difficult to achieve under-researched.

This study focuses on diversity of healthcare teams and emphasises generational diversity. Successfully engaging multiple generations in healthcare teams forms an increasingly common and important pathway to address workforce shortages and provide high quality care (Spinks & Moore, 2007). The evidence on the relationship between generational diversity and team functioning is scarce, inconclusive and mostly from developed countries (Lyons & Kuron, 2014; Woodward et al., 2015). For example, generational diversity can promote innovative team behaviour yet may also produce communication barriers (Bachus et al., 2022; Hapsari et al., 2019). We aim to expand the evidence base on the relationship between diversity, particularly generational diversity, and healthcare team functioning in rural areas of developing countries and conducted a study involving four rural Chinese hospitals.

In recent decades, many developing countries have experienced rapid and profound economic developments and social changes, which cause larger generational differences in these countries compared to developed countries with more modest development rates. For instance, China has achieved an average yearly GDP growth rate of 9.1% since initiating social reforms and opening-up in 1978, nearly threefold the 3.1% yearly

growth of the global GDP during the same period (World Bank, n.d.). Such dramatic economic developments and social changes can enlarge the differences in behaviours and values between generations (X. Yi et al., 2010), where a generation is defined as a group of people sharing birth years in a certain period and raised in a similar social and development stage (Cennamo & Gardener, 2008; Shragay & Tziner, 2011). These differences in behaviours and values may subsequently influence team functioning and performance.

Rural Chinese hospitals have been reported to traditionally employ a less diverse workforce, to recruit mostly from the local population, and to have difficulties in attractting highly educated healthcare professionals (H. Wang et al.,2023). For these rural hospitals, which provide health services for nearly half a billion rural Chinese citizens (National Bureau of Statistics of China, 2023), recruitment of young, highly educated and nonlocal professionals forms a (generational) diversity increasing pathway towards delivering high quality care envisioned to be part of UHC (World Health Organization, n.d.). To the best of our knowledge, existing evidence of the challenges posed by (generational) diversity on team functioning in rural healthcare in China and elsewhere is scarce and mostly of a qualitative nature (H. Wang et al., 2023; Lehmann et al., 2008; Van de Klundert et al., 2018). This study in rural China presents a first quantitative study into the relationship between diversity and teamwork behaviour.

Generational diversity is based on demographic characteristics and therefore regarded as a form of surface-level diversity (Van Emmerik & Brenninkmeijer, 2009, Williams et al., 2007). Generational diversity may lead to perceived (dis)similarities between generations regarding communication styles and work attitudes (K. Becker et al., 2022; Tolbize, 2008). Such perceived (dis)similarities are forms of deep-level diversity, as they are associated with underlying attributes such as beliefs, attitudes and values (Williams et al., 2007). Jansen & Searle's review (2021) on team diversity recommends researching surface-level and deep-level diversity simultaneously.

Empirical evidence and several well-known theories support a relationship between perceived similarity and team functioning. Shemla et al.'s (2016) review reports that perceived similarity is positively related to team members' supportive behaviour (i.e. social and task exchange) and team commitment and negatively related to employees' intention to resign. Jansen & Searle's (2021) review also states that perceived similarity benefits team performance, team efficiency and job satisfaction. The similarity attraction theory (Byrne, 1971) suggests that similar team members understand each other's thoughts and behaviours better and, therefore, are more likely to interact with one another (Mehra et al., 1998; Williams et al., 2007). In addition, the social identity

theory (Tajfel, 1974) and the self-categorisation theory (Turner, 2010) propose that team members may categorise other team members they perceived to be similar to themselves as "ingroups" with whom they are more willing to interact than with less similar team members, the "outgroups".

As perceived similarity may be directly associated with communication and interaction, we operationalise team functioning through three individual behaviours which are especially considered to be essential for healthcare delivery: speaking up, silence and knowledge sharing. Silence and speaking up refer to the extent individuals voice work-related issues. Several reviews and studies present the positive effect of speaking up (Kolbe et al., 2012; Okuyama et al., 2014) and the negative effect of silence (Henriksen & Dayton, 2006) on team functioning in healthcare. Over the past years, knowledge sharing has also received much attention in healthcare (Chang et al., 2012; Karamitri et al., 2017; Kessel et al., 2012). Team members might still share knowledge to promote team functioning even when the team climate does not support speaking up and/or speaking up is not seen as appropriate.

In case generational diversity translates into perceived similarity, and the latter impacts speaking up, silence and knowledge sharing, perceived similarity acts as a mediating mechanism via which generational diversity impacts the three teamwork behaviours. This study aims to investigate how generational diversity and perceived similarity influence speaking up, silence and knowledge sharing in rural Chinese hospitals.

## HYPOTHESES

### *Relationship between generational diversity and perceived similarity*

Generational diversity arises when a team includes members from at least two generations. Commonly considered generations in scientific literature are Baby Boomer (born between 1946 and 1964), Generation X (born between 1965 and 1981) and Generation Y (born between 1982 and 2000) (Moore et al., 2015). This categorisation is rooted in Western context and evidence and may not have external validity in rural China which has developed quite differently. In this study, we follow the generational categorisation mostly used in China-related literature which distinguishes the decades "1960s, 1970s, …" to define corresponding generations (Liang & Xu, 2018; X. Yi et al., 2010; X. Yi et al., 2015; Zuo & Lai, 2020). Each of these generations has its characteristics that are relevant for team functioning. For example, in China, people born in the 1970s are more collectivist and pragmatic, while those born in the 1980s are more individualistic and confident (X. Yi et al., 2010; X. Yi et al., 2015).

Perceived similarity is one's perception of the similarity between people (Morry et al., 2011) and is related to deep-level attributes (i.e. underlying elements such as values, attitudes and beliefs) (Williams et al., 2007). (Surface-level) generational diversity may underpin perceived similarity via generational differences in values, attitudes and beliefs (Jones et al., 2018; Lyons & Kuron, 2014). In a generationally diverse team, people from different generations may therefore hold distinct values, attitudes and beliefs and will, therefore, perceive those from other generations dissimilar to themselves. For the same reason, team members may be more likely to consider other team members from the same generation as similar to themselves. We thus propose:

**Hypothesis 1**: Generational diversity is negatively related to perceived similarity.

### *Relationship between perceived similarity and teamwork behaviours*

Speaking up, also known as voice behaviour, is defined as expressing one's opinions about any work-related matters (Mowbray et al., 2015; Premeaux & Bedeian, 2003). Employee silence refers to "withholding ideas, information and opinions" relevant to the improvements in workplace (van Dyne et al., 2003). Speaking up and silence are not affirmatively opposite and can coexist. Individuals who speak up on certain issues can intentionally withhold their ideas and keep silent about other issues at the same time (Sherf et al., 2021; van Dyne et al., 2003). Knoll & Redman (2016) even find that some types of speaking up and silence behaviours (i.e. promotive speaking up and cooperative silence) are positively correlated.

Sometimes, team members may not be able or willing to point out work-related issues but may still practice knowledge sharing. Knowledge sharing refers to people sharing their work-related knowledge with team members to help improve the team effectiveness (Qazi et al., 2020; J. Yi, 2009).

Antecedents of speaking up, silence and knowledge sharing are identified by previous reviews and studies. For example, some reviews summarise the factors influencing speaking up and silence behaviour (e.g. motivation, contextual factors, individual factors and organisational factors) (Lainidi et al., 2023; S. Lee et al., 2021; Lu & Xie, 2013; Okuyama et al., 2014). S. Wang & Noe (2010) have studied the factors influencing knowledge sharing and provide evidence that diversity on demographic features (e.g. gender, education and marital status) is associated with knowledge sharing in non-healthcare settings. Workplace ostracism has been shown to be negatively related to speaking up (Deniz & Cimen, 2022; Imran et al., 2023) and knowledge sharing (Takhsha et al., 2020; G. Wang et al., 2023) but to be positively associated with silence (Gkorezis et al., 2016; Imran et al., 2023) and knowledge hiding (Bhatti et al., 2023; Zhao et al., 2016).

The similarity attraction theory suggests that people will be attracted by those similar to themselves but ostracise dissimilar ones (Byrne, 1971). According to this theory, individuals more easily build good interpersonal relations with similar ones, understand the thoughts and behaviours of similar ones and are subsequently more likely to interact with them (Mehra et al., 1998; Williams et al., 2007). Following this line of reasoning, team members would be more likely to speak up and share knowledge within the team and less likely to withhold their ideas if they perceive themselves more similar to each other. Conversely, team members would be more reluctant to express their ideas and share their knowledge and more prone to keeping silent with team members perceived as dissimilar from themselves. Therefore, we propose:

**Hypothesis 2a**: Perceived similarity is positively related to speaking up.

**Hypothesis 2b**: Perceived similarity is negatively related to silence.

**Hypothesis 2c**: Perceived similarity is positively related to knowledge sharing.

### *The mediating role of perceived similarity*

The similarity attraction theory posits that individuals' actual similarity (e.g. demographic characteristics) leads to perceived similarity and consequently influence people's behaviour (Byrne, 1971). As generational diversity creates dissimilarity, individuals may perceive team members from other generations to be dissimilar, causing them to be less likely to speak up, more likely to remain silent and less likely to share knowledge. Likewise, low generational diversity within teams, as occurs when there are few generational differences between team members, would imply high perceived similarity and to promote the speaking up and knowledge sharing and reduce silence. We accordingly propose:

**Hypothesis 3**: Perceived similarity mediates the relationship between generational diversity and a) speaking up, b) silence and c) knowledge sharing.

## METHODS

### *Sample and procedure*

Following our research aims, we approached rural hospitals in China and more specifically seven county-level hospitals, with the help of the Health Human Resources Development Centre of the National Health Commission of China and the County Health Media. The former one is responsible for promoting the human resource management

for hospitals of all levels in China, while the latter one is a media company focusing on China's county-level hospitals. Four out of the seven county-level hospitals accepted our invitations to participate in the study. These four hospitals are located in four different provincial administrative regions across China. Together, these four hospitals employ 3500 employees, among whom are around 1000 doctors and 1700 nurses.

This study was conducted in the form of an online survey that was disseminated via the widely used Chinese survey platform "Wen Juan Xing" in October 2022. Participants were team members, including doctors, nurses and other healthcare professionals, working in monodisciplinary teams from the four county-level hospitals. Team leaders were only included for the measurement of generational diversity but not for the other constructs.

The Research Ethics Review Committee of Erasmus School of Health Policy and Management, Erasmus University Rotterdam approved this study (No. ETH2122-0807). Consent was obtained from each respondent before the data collection.

### *Measures*

***Generational diversity***. Following existing literature on the definition of generations in China, , we specified the generations into 5 categories: born between 1960 and 1969, born between 1970 and 1979, born between 1980 and 1989, born between 1990 and 1999, and born after 2000 (Liang & Xu, 2018; X. Yi et al., 2010; X. Yi et al., 2015; Zuo & Lai, 2020). Team members and team leaders were asked to fill in the number of people for each category on their teams. The generational diversity perceived by each participant is calculated using Blau's index (Blau, 1977): $1 - \sum_{i=1}^{n} p_i^2$, where $p_i$ is the perceived proportion of team members in the $i^{th}$ category (generation), and $n$ is the perceived number of categories (generations) in the team. Blau's index equals 0 if all team members are from the same generation and increases as the members are divided over more generations. As generational diversity is a team-level construct, we calculated the mean of the individual Blau's indices of team members and team leaders for each team to express perceived generational diversity at the team-level.

***Perceived similarity***. We measured the perceived similarity between team members using Williams et al.'s (2007) 6-item measure, which was adapted from Liden et al. (1993). This scale is a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The Cronbach's α in this study is 0.97.

***Speaking up***. Speaking up was measured by a 6-item measure, developed by van Dyne and LePine (1998) and adapted by Morrison et al. (2011). This 7-point Likert scale ranges from 1 (strongly disagree) to 7 (strongly agree). The Cronbach's α in this study is 0.94.

***Silence***. A 5-item measure developed by Detert and Edmonson (2011) and adapted by Guenter et al. (2017) and Mignonac et al. (2018) was used to test employee silence. The items were rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The Cronbach's α in this study is 0.94**.**

***Knowledge sharing***. We assessed knowledge sharing with Pittino et al.'s (2018) 5-item measure, as adapted from Bartol et al. (2009). A 7-point Likert scale was used for rating, ranging from 1 (strongly disagree) to 7 (strongly agree). The Cronbach's α in this study is 0.99.

***Control variables***. From a wide set of literature based control variables, gender and team tenure were significantly associated with one of the dependent variables in preliminary analysis and therefore included (Bartol et al., 2009; Dong et al., 2017; Guenter et al., 2017; Morrison et al., 2011; van Dyne & LePine, 1998; Williams et al., 2007). Furthermore, we also controlled for team size at team level as it is found to influence speaking up and other interaction within a team in previous research (LePine & van Dyne, 1998; Post, 2015).

The measures for perceived similarity, speaking up, silence and knowledge sharing are presented in Appendix 4. All measures were translated from English to Chinese using the standard translation/back-translation technique before data collection (Behling & Law, 2000). The average scores of the items for each scale were used to form the individual measurements of perceived similarity, speaking up, silence and knowledge sharing for each participant.

## *Analysis*

All the analyses were conducted via SPSS 29 and AMOS 28. We conducted descriptive and correlation analyses via SPSS and confirmatory factor analysis (CFA) via AMOS to provide an overview of the data. The CFA shows good factor loadings for perceived similarity, speaking up, silence and knowledge sharing, ranging from 0.72 to 0.99. The model fit indices of the CFA suggest that the four-factor model (i.e. a model with perceived similarity, speaking up, silence and knowledge sharing being separate factors) presents an acceptable model fit ($\chi^2(203)=1796.92$, CFI=0.94, TLI=0.94, RMSEA=0.10, SRMR=0.05) and fits significantly better than the three-factor model (i.e. combining speaking up and silence into one factor; $\chi^2(206)=5491.54$, $p<0.01$, CFI=0.81, TLI=0.79, RMSEA=0.18, SRMR=0.14) , two-factor model (i.e. combining speaking up, silence and knowledge sharing; $\chi^2(208)=8163.26$, $p<0.01$, CFI=0.71, TLI=0.68, RMSEA=0.21, SRMR=0.18) and one-factor model (i.e. combining all the four as one factor; $\chi^2(209)=12430.70$, $p<0.01$, CFI=0.56, TLI=0.51, RMSEA=0.26, SRMR=0.21).

Multilevel analysis was used to analyse the data as respondents were nested within teams, and teams were further nested within hospitals, which caused dependencies between observations. The standard mixed linear models in SPSS showed that there were significant between-team variances for the three dependent variables (i.e. speaking up, silence and knowledge sharing), indicating the necessity to conduct a multilevel analysis. However, between-hospital variances were not significant. Therefore, a two-level mediation analysis was performed; within-group (level 1) was the individual level, while between-group (level 2) was the team level. We chose the random effects model for the multilevel mediation analysis as it is expected that the intercepts and slopes will vary across higher-level groups (i.e. teams) (Bell et al., 2019).

We used the MLmed macro in SPSS to conduct the multilevel mediation analysis (Rockwood, 2017). In the interface of the MLmed macro, three different random effects models were built with "speaking up", "silence" and "knowledge sharing" (level 1) as dependent variables. "Generational diversity" (level 2) served as the independent variable, while "perceived similarity" (level 1) served as a mediator. These three models were 2-1-1 multilevel mediation models in which the independent variable was a team-level (level 2) variable, and the other variables were at the individual level (level 1). The control variables gender and team tenure were level-1 covariates, and team size was a level-2 covariate.

As generational diversity is a level-2 variable, the random-effect parameters only account for the intercepts of the mediator and dependent variables and the slopes regarding the relationships between perceived similarity and the three behavioural variables (i.e. speaking up, silence and knowledge sharing) as these four variables are all at level 1.

Additional multilevel mediation analyses replacing generational diversity by the diversity in the composition of local and non-local healthcare professionals were conducted to provide more insights for future research.

## RESULTS

### *Descriptive analysis*

841 valid questionnaires were received from the respondents working in 248 monodisciplinary teams in the four studied hospitals. The average age of the 841 respondents is 32.10 years (median: 31.00; standard deviation: 8.08). The average team tenure is 6.71 years (median: 5.00; standard deviation: 6.37). The percentage of doctors in the respondents (38.64%) is similar to that in all Chinese hospitals (38.04%), while the

percentage of nurses (56.96%) is higher than the national data (44.81%) (National Health Commission, 2023). The respondents' demographic characteristics are shown in Table 1.

*Table 1. Demographic characteristics*

| | Number of people (Percentage) |
|---|---|
| **Gender** | |
| Male | 165 (19.62%) |
| Female | 652 (77.53%) |
| Prefer not to say | 24 (2.85%) |
| **Age*** | |
| <=30 | 414 (49.23%) |
| 31-40 | 287 (34.13%) |
| 41-50 | 103 (12.25%) |
| >=51 | 32 (3.80%) |
| **Profession** | |
| Doctors | 325 (38.64%) |
| Nurses | 479 (56.96%) |
| Other healthcare professionals | 37 (4.40%) |
| **Local or non-local** | |
| Local | 731 (86.92%) |
| Non-local | 110 (13.08%) |
| **Education background** | |
| Master | 18 (2.14%) |
| Bachelor | 593 (70.51%) |
| Lower than bachelor | 230 (27.35%) |
| **Professional title** | |
| Senior | 17 (2.02%) |
| Deputy senior | 55 (6.54%) |
| Intermediate | 215 (25.56%) |
| Junior | 554 (65.87%) |

** There are missing values regarding age, so the sum of the number of people per age group is smaller than the total number of respondents.*

The correlation analyses (Table 2) show significant strong correlations between on the one hand perceived similarity and on the other hand speaking up ($r$= 0.65, $p$<0.01) and knowledge sharing ($r$= 0.67, $p$<0.01) but a small to moderate correlation between perceived similarity and silence ($r$=0.26, $p$<0.01). Significant strong correlation is also shown between speaking up and knowledge sharing ($r$= 0.75, $p$<0.01), while the positive correlation between speaking up and silence is moderate ($r$=0.33, $p$<0.01). Generational diversity at team level is not significantly correlated to either perceived similarity or individual behaviours. Full collinearity test shows that the values of the variance inflation factors for all the control variables, independent variable and mediator range from 1.01 to 1.12, indicating no multicollinearity issues in this study (Kim, 2019).

*Table 2. The correlation matrix of all variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. Gender (1=female) | 1.00 | | | | | | | |
| 2. Team tenure | -0.19** | 1.00 | | | | | | |
| 3. Team size | 0.02 | 0.10** | 1.00 | | | | | |
| 4. Generational diversity*** | -0.14** | 0.23** | 0.22** | 1.00 | | | | |
| 5. Perceived similarity | 0.07 | 0.00 | -0.03 | -0.00 | 1.00 | | | |
| 6. Speaking up | 0.02 | 0.04 | -0.06 | 0.01 | 0.65** | 1.00 | | |
| 7. Silence | -0.02 | 0.06 | -0.01 | 0.04 | 0.26** | 0.33** | 1.00 | |
| 8. Knowledge sharing | 0.12** | -0.01 | -0.03 | 0.00 | 0.67** | 0.75** | 0.15** | 1.00 |

***: p<0.01*

****: The generational diversity is a team-level construct, and thus a single value is assigned to all the individuals from the same team within the range of 0 and 0.8.*

## *Multilevel mediation analysis*

The three 2-1-1 multilevel mediation models are shown in Table 3.

*Table 3. Multilevel mediation analyses*

| | **Perceived similarity** | **Speaking up** | **Silence** | **Knowledge sharing** |
|---|---|---|---|---|
| ***Fixed effects*** | | | | |
| **Within-group (Level 1)** | | | | |
| Intercept | 5.46** | 1.75** | 1.65* | 2.39** |
| **Perceived similarity** | - | 0.56** | 0.39** | 0.54** |
| Gender | 0.23 | 0.04 | -0.31 | 0.30** |
| Team tenure | -0.00 | 0.00 | 0.01 | -0.01 |
| **Between-group (Level 2)** | | | | |
| **Generational diversity** | 0.07 | 0.08 | 0.44 | 0.09 |
| **Perceived similarity** | - | 0.69** | 0.38** | 0.60** |
| Gender | 0.27 | -0.15 | 0.11 | 0.14 |
| Team tenure | 0.01 | 0.01 | 0.02 | 0.00 |
| Team size | -0.00 | -0.00 | -0.00 | -0.00 |
| **Indirect effect (Mediation)** | - | 0.05 | 0.03 | 0.04 |
| ***Random effects (Variance)*** | | | | |
| Intercept | 0.19** | 0.03 | 0.41** | 0.04 |
| Slope | - | 0.12** | 0.04 | 0.11** |

**: p<0.05; **: p<0.01*

Table 3 shows that there is no significant relationship between generational diversity and perceived similarity ($\beta$=-0.07, $p$>0.05). Therefore, hypothesis 1 is rejected, which also violates the first requirement for a mediating relationship.

The results also show that perceived similarity is positively related to all the three behavioural variables at both the within-group level (speaking up: $\beta$= 0.56, p<0.01; silence: $\beta$=0.39, p<0.01; knowledge sharing: $\beta$=0.54, p<0.01) and between-group level (speaking up: $\beta$=0.69, p<0.01; silence: $\beta$=0.38, p<0.01; knowledge sharing: $\beta$=0.60, p<0.01). These findings indicate that people will be more likely to speak up, keep silent and share knowledge when they perceive themselves more similar to team members. As a result, these results support hypotheses 2a and 2c but reject hypothesis 2b, which specifies a negative relationship between perceived similarity and silence.

The random-effect parameters show that the relationships between perceived similarity and speaking up (0.12, p<0.01) and between perceived similarity and knowledge sharing (0.11, p<0.01) significantly vary across groups, while the relationship between perceived similarity and silence (0.04, p>0.05) does not significantly change between groups. These findings illustrate that within the teams with the same extent of perceived similarity, team members in some of these teams are more willing to speak up and share knowledge than those in some other teams, but the extent of keeping silent does not vary across teams. Furthermore, the intercepts of perceived similarity and silence vary across groups, while those of speaking up and knowledge sharing do not. These results indicate that team members from different teams have different degrees of the perceptions towards other team members and keeping silent. However, the extent of speaking up and sharing knowledge remain constant across teams.

As generational diversity is a level-2 variable, only between-group direct effects (i.e. the relationships between generational diversity and the three behavioural variables) and mediated effects (i.e. indirect effects) are evaluated. As shown in Table 3, there are neither significant direct effects of generational diversity on the three behavioural variables (speaking up: $\beta$=0.08, p>0.05; silence: $\beta$=0.44, p>0.05; knowledge sharing: $\beta$=0.09, p>0.05) nor significant mediated effects via perceived similarity (speaking up: $\beta$=0.05, p>0.05; silence: $\beta$=0.03, 0>0.05; knowledge sharing: $\beta$=0.04, p>0.05). Therefore, hypothesis 3 is not supported.

## DISCUSSION

This study investigates the relationships among generational diversity, perceived similarity, speaking up, silence and knowledge sharing in rural Chinese hospitals. In contrast to the theory-informed hypotheses formulated, this study finds no significant relationships between generational diversity and the other four variables (i.e. perceived similarity, speaking up, silence and knowledge sharing) and therefore appears to exclude significant direct and mediated effects of generational diversity on these variables.

Generational diversity is defined on the basis of age groups and therefore on a surface-level attribute (van Emmerik & Brenninkmeijer, 2009, Williams et al., 2007). Literature shows that surface-level similarity is not necessarily in alignment with perceived similarity (Jehn et al., 1999; Williams et al., 2007). We tried to establish the connection between generational diversity and perceived similarity via intergenerational differences as the latter two are related to deep-level attributes (e.g. values, attitudes and beliefs) but found non-significant relationship. Other determinants of perceived similarity exist as well, which may influence perceived similarity more strongly. For instance, Ott-Holland et al. (2014) demonstrate that gender plays a role in perceived similarity, and females perceive themselves more similar to others than do males. H. Wang et al. (2023) find that local origin may impact perceived similarity. People raised in the same place share the local culture, norms and social background and therefore are more likely to form similar values and beliefs. Of the respondents included in this study, 86.85% were born and raised in the areas where their hospitals were located. An additional analysis, however, reveals that the composition of local and non-local employees is not significantly related to perceived similarity, nor to individual behaviours (Appendix 5). More research is needed to understand the determinants of perceived similarity.

Our findings show that perceived similarity is positively associated with speaking up and knowledge sharing at both individual and team level. These findings confirm the similarity attraction theory, which posits such interactive behaviours to be associated with similarity (Byrne, 1971). The social identity theory (Tajfel, 1974) and the self-categorisation theory (Turner, 2010) provide further theoretical support for this finding. Similar people will categorise themselves as “ingroups”, enhance their self-image and then be more willing to interact with each other. Conversely, persons perceive dissimilar ones as “outgroups” and amplify the differences between “ingroups” and “outgroups”, which may form intergroup conflicts and finally reduce the frequency of intergroup interactive behaviours. The evidence found and theoretical support thus indicate that increasing the recruitment of healthcare workforce in rural Chinese hospitals (and other rural settings) to strengthen the quality of care and UHC may negatively influence

speaking up and knowledge sharing and impede teamwork if it causes perceived dissimilarity to increase.

Counter to our hypothesis, perceived similarity is positively related to silence at both individual and team level. The social identity theory (Tajfel, 1974) and the self-categorisation theory (Turner, 2010) may provide explanations for this finding. Team members may consider other team members perceived as similar as "ingroups" with whom they develop personal relationships. These personal relationships may subsequently lead them to refrain from commenting openly on the functioning of these "ingroups". As this study was conducted in rural China, the Chinese cultural value of "saving face" and "harmony" to promote team functioning may further amplify this mechanism (Cardon & Scott, 2003). This cultural perspective sheds a novel light on the common, perhaps Western, view that silence is harmful to team functioning in healthcare (Henriksen & Dayton, 2006). Furthermore, team members may be less likely to remain silent about or with dissimilar team members ("outgroups"), as perceived dissimilarity is always accompanied by dissatisfaction with others (J. Becker & Tausch, 2014; Sultana et al., 2022).

In addition to the positive association between perceived similarity and both of speaking up and silence, we somewhat surprisingly find a positive correlation between the latter two. This correlation may be explained by distinguishing various subtypes of speaking up and silence. Scientific literature has identified acquiescent speaking up/silence (expressing/withholding ideas based on resignation and low self-efficacy), defensive speaking up/silence (expressing/withholding ideas based on self-protection and fear) and prosocial speaking up/silence (expressing/withholding ideas based on benefiting the organisation and cooperation) (van Dyne et al., 2003). These different forms of speaking up and silence can, for example, explain that team members express constructive suggestions with the goal of benefiting the team while keeping silent to protect themselves and their "ingroups" on other occasions. Our findings from the rural Chinese context thus confirm that speaking up and silence are distinct constructs rather than a pair of opposite behaviours (Sherf et al., 2021; van Dyne et al., 2003). It is worthwhile to investigate subtypes of speaking up and silence, and their relationship with perceived similarity in future research on team functioning and performance, especially in settings in which health workforce strengthening is likely to increase dissimilarity.

### *Practical implications*

Our study shows teamwork behaviour is associated with perceived similarity yet less so with generational diversity. This is relevant as the teamwork behaviours studied (i.e. speaking up, silence and knowledge sharing) are associated with team performance

and quality of care. Thus, rural Chinese hospital management may leverage the benefits of perceived similarity for team functioning to improve the quality of care and UHC. At the same time, our findings indicate that increases in generational diversity, which may result from ongoing workforce strengthening efforts, will not negatively impact the studied teamwork behaviours in support of healthcare quality and achieving UHC. However, when recruitment efforts for workforce strengthening lead to more perceived dissimilarity in teams, these dissimilarities need to be managed, for instance through team training, to avoid negative impacts on team functioning and, possibly, quality of care.

### *Limitations*

There are several limitations for this study. First, only four Chinese county-level hospitals were included, which may lead to a selection bias and may not depict a full picture of all rural Chinese hospitals. Still, of the four participating hospitals, two are from distinct northern Chinese regions, and the other two from distinct southern Chinese regions. Second, the number of people who received the survey link is unknown, so we are not able to calculate the response rate. Third, all the variables were measured with the same respondents and via the same data collection method (survey), which may produce common source bias and common method bias. Fourth, the cross-sectional design does not allow claims about causality of the significant relationships between perceived similarity and the three teamwork behaviours studied.

## CONCLUSION

Perceived similarity is positively related to speaking up, silence and knowledge sharing at both individual and team level. Generational diversity has no significant relationships with perceived similarity nor with these three teamwork behaviours. Thus, if healthcare workforce strengthening increases generational diversity, this may not impact team behaviour and performance. However, explicit management efforts to mitigate the negative impact on team behaviour and care provision are called for if the healthcare workforce strengthening required for improving quality of care and UHC reduces perceived similarity in teams. More research is needed to explore the antecedents of (deep-level) perceived similarity and the interaction between perceived similarity and various forms of speaking up and silence.

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# 5

# Do leader-member relationships impact team effectiveness via speaking up and silence? A cross-sectional study in rural Chinese hospitals

Wang, H., Buljac-Samardzic, M., van Wijngaarden, J., & van de Klundert, J. Do leader-member relationships impact team effectiveness via speaking up and silence? A cross-sectional study in rural Chinese hospitals. (submitted)

## ABSTRACT

**Introduction**: Leader-member relationships importantly determine leadership effectiveness and teamwork. However, the literature leaves the role of leader-member relationships in team functioning largely unaddressed, particularly in rural areas in developing countries. This relationship is especially of importance in rural Chinese hospitals as improving teamwork in these hospitals forms a national health reform priority. To expand the knowledge and evidence based for teamwork, this study investigates how the two relational aspects leader-member perceived similarity and power distance orientation influence perceived quality of care and job satisfaction via speaking up and silence in this context.

**Methods**: A quantitative study was conducted in October 2022. Data were collected from 1,017 team members of healthcare teams in four rural Chinese hospitals via online questionnaire. Multilevel mediation analyses were used to test the hypotheses.

**Results**: Leader-member perceived similarity and power distance orientation are positively related to speaking up and to silence. Speaking up is positively related to perceived quality of care and job satisfaction, while silence has no significant relationship with these two outcomes. Finally, speaking up mediates the associations of both leader-member perceived similarity and power distance orientation with the team outcomes perceived quality of care and job satisfaction.

**Conclusions**: Speaking up plays an important role in transmitting the impact of leader-member relationships to team outcomes in rural Chinese hospitals, while the role of silence is negligible. Hospital management may seek to form teams in which leaders and members are relatively similar and to promote team members' power distance orientation with the purpose to stimulate speaking up behaviour and, subsequently, improve team effectiveness. Future research into the subtypes of speaking up and silence and their antecedents and outcomes in rural China and elsewhere is called for.

**Keywords**: leader-member relationship, leader-member perceived similarity, power distance orientation, speaking up, silence

## INTRODUCTION

Leader-member relationships have received much attention in the research into team functioning and leadership in healthcare (and other industries) across the globe, including rural areas in developing countries in recent decades (Antonakis & Atwater, 2002; Etges & Coelho, 2023; Napier & Ferris, 1993; Shemdoe et al., 2016). The two relational aspects leader-member perceived similarity and power distance orientation are impactfully present in rural Chinese hospitals, where most employees are locals who share cultural and living backgrounds and develop close interpersonal relationships with their colleagues, including the leaders (H. Wang et al., 2023). This localised characteristic may drive employees to perceive their leaders as similar to themselves and cultivate low power distance orientation even though power distance is traditionally high in China.

While leader-member perceived similarity and power distance orientation have been linked to employee behaviour and team performance (Culpepper & Watts, 1999; Huang & Iun, 2006), a comprehensive understanding of this relationship is lacking. Derue et al. (2011) have hypothesised in the Integrated Model of Leader Traits, Behaviours and Effectiveness that leader-member perceived similarity will lead to employee and team effectiveness but were not able to test this relationship and provide evidence. Cornelis et al. (2011) present a positive relationship between leader-member perceived similarity and team cooperation. Likewise, there is initial evidence suggesting that power distance orientation is negatively related to employee mental health and job satisfaction (Lin et al., 2013) and might enlarge the leader-member communication gap and reduce employee participation (Khatri, 2009). Nonetheless, the evidence on the roles of leader-member perceived similarity and power distance orientation in team functioning is scarce and mostly from developed countries.

Based on the input-process-outcome framework which is the foundation of many teamwork models in healthcare (e.g. Dietz et al., 2014; Korner et al., 2016; Lemieux-Charles & McGuire, 2006), leader-member perceived similarity and power distance orientation can be seen as two team input elements which may impact outcomes via team processes. Morrison's (2014) review shows that the leader-member relationship and hierarchy are antecedents of speaking up and silence, thus providing theoretical support for the relationship between the team inputs leader-member perceived similarity and power distance orientation and the team processes speaking up and silence. Speaking up and silence are crucial team processes in hospitals, determining outcomes and specifically quality of care (Okuyama et al., 2014; Szymczak, 2016). Speaking up and silence are seen as different constructs and can coexist as team members may speak up on some issues while being silent on others (Sherf et al., 2021; van Dyne et al., 2003).

Team outcomes such as quality of care and job satisfaction are typically associated positively with speaking up and negatively with silence (Burris et al., 2013; Henriksen& Dayton, 2006; Lee et al., 2022; Okuyama et al., 2014). Accordingly, we propose that the team processes speaking up and silence transmit the impact of the team inputs leader-member perceived similarity and power distance orientation to the team outcomes perceived quality of care and job satisfaction. We investigate these relationships in rural China as China's rural hospitals have especially been requested to improve teamwork and the above-mentioned outcome quality of care (World Bank & World Health Organization, 2019). More specifically, we aim to investigate the relationships among leader-member perceived similarity, power distance orientation, speaking up, silence, perceived quality of care and job satisfaction in rural Chinese hospitals.

China is culturally different from Western contexts where most of the evidence on team functioning stems from and feeds into theory. Moreover, cultural differences are also present within China, for example, between rural and urban China (Ann et al., 2014). For instance, rural Chinese citizens tend to have kept the traditional Chinese cultural value "collectivism" (X. Wang et al., 2016), while urban Chinese residents have gradually become more individualistic (Shi & Hu, 2020). Such cultural disparities may reduce the validity and generalisability of current evidence for rural China and its 17,555 rural hospitals (National Health Commission, 2023). With this research, we aim to strengthen the scientific understanding of teamwork in this setting and contribute to an evidence base for akin rural contexts in developing countries, together serving an important part of the global population seeking universal health coverage.

## HYPOTHESIS

Leader-member perceived similarity refers to team members' perceptions of similarity between themselves and team leaders (Liden et al., 1993; Turban & Jones, 1988). This perceived similarity is related to deep-level psychological attributes such as values, beliefs and attitudes, different from actual similarity which is based on surface-level demographic characteristics such as age, gender and race (Wolfram & Mohr, 2009). Perceived similarity plays a more important role in leader-member interaction and team functioning than actual similarity (Abu Bakar & McCann, 2018; Liden et al., 1993).

Speaking up is defined as voluntarily expressing ideas, suggestions or opinions about work-related issues with the intention of workplace improvements within teams (Morrison, 2014, 2023) and used interchangeably with voice behaviour (Greenberg & Edwards, 2009; van Dyne et al., 2003). Silence refers to withholding ideas or opinions

about work-related issues or behaviours that violate personal or moral standards (Morrison, 2014, 2023). As mentioned above, speaking up and silence are distinct constructs and can be practiced simultaneously depending on topic.

The similarity attraction theory (Byrne, 1971) suggests that team members are more likely to interact with other team members perceived as similar to themselves. More specifically, there is evidence that leader-follower similarity is positively related to employees' voice behaviour (Afsar & Shahjehan, 2018; Weber & Avey, 2019) and (indirectly) negatively related to employees' defensive silence behaviour (Erkutlu & Chafra; 2020). Hence, we posit that team members are more likely to express their ideas and less likely to keep silent when they perceive their leaders as similar to themselves.

**Hypothesis 1**: Leader-member perceived similarity is positively related to speaking up while negatively related to silence.

Power distance orientation refers to the degree of an individual's acceptance of unequal distribution of power among individuals within organisations (Clugston et al., 2000; Farh et al., 2007). Based on the cultural dimensions theory (Hofstede, 1980), people with high power distance orientation readily accept the fact that power is unequally distributed and believe that decisions made by the people with a higher position should not be questioned. This may promote silence and impede speaking up. Conversely, when team members have a low power distance orientation and believe power should be distributed more equally, they may be less likely to remain silent and more likely to speak up. There is indeed evidence that power distance orientation is negatively related to voice behaviour (Botero & van Dyne, 2009; Guo et al., 2020) and positively related to employee silence (Li & Xing, 2021). Thus, we propose:

**Hypothesis 2:** Power distance orientation is negatively related to speaking up while positively related to silence.

Effective communication in general and speaking up in particular are considered to benefit the quality and safety of care, for example, in case of raising concerns about safety issues (Leonard et al., 2004; Okuyama et al., 2014). Silence and failure in communication can lead to adverse events and threaten patient safety (Henriksen & Dayton, 2006), which will consequently reduce the perceived quality of care. Likewise, speaking up and communication are found to be positively related to job satisfaction (Liang & Yeh, 2020; Musah et al, 2017), while organisational silence drives employees to be less satisfied with their job (Fard & Karimi, 2015; Vakola & Bouradas, 2005). Moreover, team members who speak up and perceive their opinions are valued and supported by their leaders are

more likely to experience a sense of belonging and be satisfied with working on the team (Waller, 2021). Thus, we propose:

**Hypothesis 3**: Speaking up is positively related to perceived quality of care and job satisfaction.

**Hypothesis 4**: Silence is negatively related to perceived quality of care and job satisfaction.

Altogether, the similarity attraction theory (Byrne, 1971), the cultural dimensions theory (Hofstede, 1980) and the input-process-outcome teamwork framework (e.g. Dietz et al., 2014; Korner et al., 2016; Lemieux-Charles & McGuire, 2006) suggest that the team processes speaking up and silence mediate the effects from the team inputs leader-member perceived similarity and power distance orientation to the team outcomes perceived quality of care and job satisfaction. Team members who perceive their leaders similar to themselves and have a low power distance orientation are more likely to speak up and less likely to stay silent on issues with the quality of care, which may subsequently translate to higher perceived quality of care and job satisfaction. Reasoning along this line, we propose:

**Hypothesis 5**: Speaking up and silence mediate the effect of leader-member perceived similarity on perceived quality of care and job satisfaction.

**Hypothesis 6**: Speaking up and silence mediate the effect of power distance orientation on perceived quality of care and job satisfaction.

The corresponding theoretical model is shown in Figure 1.

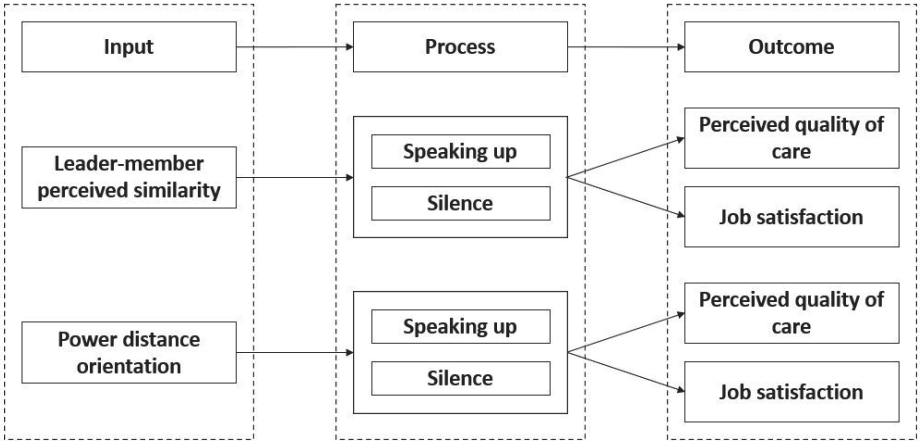


Figure 1. Theoretical model

## METHODS

### *Sample and procedure*

This study was approved by the Research Ethics Review Committee of Erasmus School of Health Policy & Management, Erasmus University Rotterdam (No. ETH2122-0807). We obtained consent from respondents before data collection.

The Health Human Resources Development Centre of the National Health Commission of China and the County Health Media helped us connect to seven rural Chinese hospitals. Four of these hospitals, together employing 3,500 employees including about 1,000 doctors and 1,700 nurses, agreed to participate in this study. Respondents were team members from healthcare teams. Team leaders were excluded as respondents. Data were collected via online questionnaires on the Chinese survey platform "Wen Juan Xing" in October 2022.

### *Measures*

All the items of the measurements for each variable are shown in Appendix 4. A 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) was used to rate the items for measuring leader-member perceived similarity, power distance, speaking up and silence.

***Leader-member perceived similarity.*** Liden et al.'s (1993) 6-item measure was used to measure leader-member perceived similarity (Cronbach's α=0.99).

***Power distance orientation.*** A 6-item measure developed by Dorfman & Howell (1988) and adapted by Culpepper & Watts (1999) and Lin et al. (2013) for individual-level measurement was used to measure power distance orientation (Cronbach's α=0.97).

***Speaking up***. A 6-item measure developed by van Dyne and LePine (1998) and adapted by Morrison et al. (2011) was used to measure speaking up (Cronbach's α=0.95).

***Silence***. Silence was measured by a 5-item measure developed by Detert and Edmonson (2011) and adapted by Guenter et al. (2017) and Mignonac et al. (2018) (Cronbach's α=0.94).

***Perceived quality of care & job satisfaction.*** We assessed individual perceived quality of care and job satisfaction by single-item indicator scales (Schmalenberg & Kramer, 2008; Stalpers et al., 2017), respectively, with the value of 1 indicating "very bad" or "very dissatisfied" and the value of 10 indicating "very good" or "very satisfied".

***Control variables***. We controlled for gender, team tenure and team type (i.e. mono- or multidisciplinary team) based on previous research (Guenter et al., 2017; Liang & Yeh, 2020; Morrison et al., 2011; van Dyne & LePine, 1998) and the significance to some of the mediators and dependent variables in preliminary analysis.

The standard translation/back-translation technique was used to translate all the measures from English into Chinese (Behling & Law, 2000). Every participant's average scores per measure were used to form the individual measurements of leader-member perceived similarity, power distance orientation, speaking up and silence.

## *Analysis*

SPSS 29 and AMOS 28 were used to analyse the data. Confirmatory factor analysis shows good factor loadings for leader-member perceived similarity, power distance orientation, speaking up and silence, ranging from 0.72 to 0.97. In addition, the four-factor model (in which leader-member perceived similarity, power distance orientation, speaking up and silence are separate factors) shows an acceptable model fit ($\chi^2(224)=1861.62$, CFI=0.95, TLI=0.95, RMSEA=0.09, SRMR=0.05) and fits significantly better than a three-factor model which combines speaking up and silence into one factor ($\chi^2(227)=6978.47$, $p<0.01$, CFI=0.80, TLI=0.78, RMSEA=0.17, SRMR=0.21), a two-factor model which additionally combines leader-member perceived similarity and power distance orientation into one factor ($\chi^2(229)=14389.88$, $p<0.01$, CFI=0.58, TLI=0.53, RMSEA=0.25, SRMR=0.29) and the one-factor model combining all four into one factor ($\chi^2(230)=17582.59$, $p<0.01$, CFI=0.48, TLI=0.43, RMSEA=0.27, SRMR=0.29).

The respondents were nested within teams, which were further nested within hospitals, resulting in dependency of observations. Moreover, significant between-team variances were found for the dependent variables (i.e. perceived quality of care and job satisfaction) via the mixed models in SPSS, while between-hospital variances were not significant. Therefore, we conducted multilevel mediation analysis with the individual level as level 1 and the team level as level 2. In addition, we adopted a random effects model as the intercepts and slopes were expected to vary across teams (Bell et al., 2019).

Four independent multilevel mediation models were created via MLmed macro in SPSS (Rockwood, 2017), with leader-member perceived similarity and power distance orientation as separate independent variables, perceived quality of care and job satisfaction as separate dependent variables and speaking up and silence as parallel mediators. The control variables gender and team tenure were level-1 covariates, and team type was a level-2 covariate. As our hypotheses all regard the individual level, all variables were measured at level 1, and the analysis concerns four 1-1-1 multilevel mediation models. To align with our hypotheses, the reporting focuses on level 1 yet also presents level-2 results (Collins & Martinez-Moreno, 2022).

## RESULTS

We received valid questionnaires from 1017 respondents who work in 248 monodisciplinary teams and 52 multidisciplinary teams in four hospitals, with an average age of 32.25 years (median: 31.00; standard deviation: 7.95) and an average team tenure of 6.67 years (median: 5.00; standard deviation: 6.19). The proportion of doctors in the respondents (37.95%) is close to that in Chinese hospitals (38.04%), while nurses account for a higher proportion (58.01%) than the national data (44.81%) (National Health Commission, 2023). The demographic characteristics are shown in Table 1.

*Table 1. Demographic characteristics*

| | Number of people (Percentage) |
|---|---|
| **Gender** | |
| Male | 204 (20.06%) |
| Female | 782 (76.89%) |
| Prefer not to say | 31 (3.05%) |
| **Age*** | |
| <=30 | 485 (47.69%) |
| 31-40 | 366 (35.99%) |
| 41-50 | 123 (12.09%) |
| >=51 | 38 (3.74%) |
| **Profession** | |
| Doctors | 386 (37.95%) |
| Nurses | 590 (58.01%) |
| Other healthcare professionals | 41 (4.03%) |
| **Local or non-local** | |
| Local | 884 (86.92%) |
| Non-local | 133 (13.08%) |
| **Education background** | |
| Master | 23 (2.26%) |
| Bachelor | 717 (70.50%) |
| Lower than bachelor | 277 (27.24%) |
| **Professional title** | |
| Senior | 25 (2.46%) |
| Deputy senior | 69 (6.78%) |
| Intermediate | 269 (26.45%) |
| Junior | 654 (64.31%) |

** The total number of per age groups is lower than the number of respondents as there are missing values for age.*

The correlation analyses show significant strong correlations between leader-member perceived similarity and speaking up ($r$=0.73, $p$<0.01), between power distance orientation and silence ($r$=0.72, $p$<0.01), and between perceived quality of care and job satisfaction ($r$=0.90, $p$<0.01) (Table 2). A significant moderate correlation is also found between speaking up and silence ($r$=0.34, p<0.01). The values of variance inflation factors for the control variables, independent variables and mediators range from 1.01 to 2.14, indicating there is no serious multicollinearity in the models (Kim, 2019).

*Table 2. Correlation matrix*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Gender (1=female) | 1.00 | | | | | | | | |
| 2. Team tenure | -0.15** | 1.00 | | | | | | | |
| 3. Multidisciplinary team | -0.03 | -0.02 | 1.00 | | | | | | |
| 4. Leader-member perceived similarity | 0.06 | 0.02 | -0.05 | 1.00 | | | | | |
| 5. Power distance orientation | -0.03 | 0.08* | 0.03 | 0.25** | 1.00 | | | | |
| 6. Speaking up | 0.03 | 0.04 | -0.04 | 0.73** | 0.27** | 1.00 | | | |
| 7. Silence | -0.02 | 0.05 | 0.02 | 0.31** | 0.72** | 0.34** | 1.00 | | |
| 8. Perceived quality of care | 0.15** | -0.09** | -0.09** | 0.37** | 0.00 | 0.34** | 0.06 | 1.00 | |
| 9. Job satisfaction | 0.15** | -0.05 | -0.13** | 0.41** | 0.00 | 0.38** | 0.07** | 0.90** | 1.00 |

**: p<0.05; **: p<0.01*

The results of the multilevel mediation analyses with leader-member perceived similarity and power distance orientation as separate independent variables are shown in Tables 3 and 4, respectively. As stated in the methods section, we only report level-1 results to test hypotheses.

Table 3 shows leader-member perceived similarity is significantly and positively associated with speaking up (β=0.61, p<0.01) and silence (β=0.41, p<0.01), partially supporting hypothesis 1. Table 4 shows power distance orientation is significantly positively related to speaking up (β=0.17, p<0.01) and silence (β=0.63, p<0.01), partially supporting hypothesis 2. Speaking up is significantly and positively related to perceived quality of care (β=0.24, p<0.01, independent variable: leader-member perceived similarity; β=0.46, p<0.01, independent variable: power distance orientation) and job satisfaction (β=0.30, p<0.01, independent variable: leader-member perceived similarity; β=0.54, p<0.01, independent variable: power distance orientation), while silence has non-significant associations with the two outcomes. The differences in the regression coefficients regarding the relationships between team processes (i.e. speaking up and silence) and team outcomes (i.e. perceived quality of care and job satisfaction) are due to the influence of including different independent variables (i.e. leader-member perceived similarity and power distance orientation) in the models and does not impact the significance. Therefore, the findings support hypothesis 3 but reject hypothesis 4, which also violates the condition of mediation relationships for silence. Accordingly, speaking up plays a significantly positive mediating role in the relationship between leader-member perceived similarity and perceived quality of care (β=0.15, p<0.01) or job satisfaction (β=0.19, p<0.01) and the relationship between power distance orientation and the two outcomes (perceived quality of care: β=0.08, p<0.01; job satisfaction: β=0.09, p<0.01). Thus, hypotheses 5 and 6 are partially supported.

*Table 3. Multilevel mediation analyses (Leader-member perceived similarity)*

| | Speaking up | Silence | Perceived quality of care | Job satisfaction |
|---|---|---|---|---|
| ***Fixed effects*** | | | | |
| Level 1 | | | | |
| Intercept | 2.27** | 1.68** | 5.83** | 5.18** |
| **Leader-member perceived similarity** | 0.61** | 0.41** | 0.27** | 0.27** |
| **Speaking up** | - | - | 0.24** | 0.30** |
| **Silence** | - | - | -0.04 | -0.04 |
| Gender | 0.02 | -0.34 | 0.38* | 0.43** |
| Team tenure | 0.01 | 0.01 | -0.02* | -0.02* |
| Level 2 | | | | |
| **Leader-member perceived similarity** | 0.62** | 0.42** | 0.33** | 0.41** |
| **Speaking up** | - | - | 0.27* | 0.29** |
| **Silence** | - | - | -0.11* | -0.12** |
| Gender | -0.07 | 0.06 | 0.51** | 0.52** |
| Team tenure | -0.00 | 0.02 | -0.02 | -0.01 |
| Multidisciplinary | -0.03 | 0.17 | -0.21 | -0.39** |
| **Indirect effect - Mediation** | | | | |
| Level 1 – **Speaking up** | - | - | 0.15** | 0.19** |
| Level 1 – **Silence** | - | - | -0.02 | -0.02 |
| Level 2 – **Speaking up** | - | - | 0.16* | 0.18** |
| Level 2 – **Silence** | - | - | -0.05* | -0.05* |
| ***Random effects*** | | | | |
| Intercept | 0.05** | 0.38** | 0.22** | 0.20** |
| Slope (Leader-member perceived similarity ~) | 0.09** | 0.05 | 0.14* | 0.14* |
| Slope (Speaking up ~) | - | - | 0.05 | 0.10 |

*: p<0.05; **: p<0.01

*The random slopes of silence to perceived quality of care and job satisfaction are tested as redundant via MLmed macro therefore are not included in the analysis.*

*Table 4. Multilevel mediation analyses (Power distance orientation)*

| | Speaking up | Silence | Perceived quality of care | Job satisfaction |
|---|---|---|---|---|
| ***Fixed effects*** | | | | |
| Level 1 | | | | |
| Intercept | 5.13** | 1.33** | 5.96** | 5.34** |
| **Power distance orientation** | 0.17** | 0.63** | -0.04 | -0.06 |
| **Speaking up** | - | - | 0.46** | 0.54** |
| **Silence** | - | - | 0.01 | 0.01 |
| Gender | 0.23 | -0.15 | 0.43** | 0.47** |
| Team tenure | 0.00 | -0.00 | -0.02* | -0.02* |
| Level 2 | | | | |
| **Power distance orientation** | 0.12** | 0.69** | -0.16* | -0.18** |
| **Speaking up** | - | - | 0.56** | 0.65** |
| **Silence** | - | - | 0.05 | 0.06 |
| Gender | 0.06 | 0.19 | 0.52** | 0.53** |
| Team tenure | 0.00 | 0.00 | -0.02 | -0.00 |
| Multidisciplinary | -0.15 | 0.02 | -0.23 | -0.42** |
| **Indirect effect - Mediation** | | | | |
| Level 1 – **Speaking up** | - | - | 0.08** | 0.09** |
| Level 1 – **Silence** | - | - | 0.00 | 0.01 |
| Level 2 – **Speaking up** | - | - | 0.07** | 0.08** |
| Level 2 – **Silence** | - | - | 0.03 | 0.04 |
| ***Random effects*** | | | | |
| Intercept | 0.17** | 0.10* | 0.24** | 0.21** |
| Slope (Power distance orientation ~) | 0.02 | 0.05* | - | - |
| Slope (Speaking up ~) | - | - | 0.19** | 0.24** |

*: p<0.05; **: p<0.01

*The random slopes of silence or power distance to perceived quality of care and job satisfaction are tested as redundant via MLmed macro therefore are not included in the analysis.*

## DISCUSSION

This study investigates the relationships among leader-member perceived similarity, power distance orientation, speaking up, silence, perceived quality of care and job satisfaction in rural Chinese hospitals.

Our findings show that healthcare professionals in rural Chinese hospitals are more likely to speak up and keep silent at the same time when they perceive their leaders more similar to themselves and when they have a relatively high power distance orientation. These findings contradict our hypotheses in two ways. First, the positive relationship between power distance orientation and speaking up is opposite to our hypothesis. Interestingly, this finding appears to be at odds with extant scientific literature. Possible explanations may lie in the subtypes of speaking up as distinguished to relate to different motives: acquiescent, defensive and prosocial speaking up (van Dyne et al., 2003). For example, healthcare professionals with high power distance orientation might express their supportive ideas (i.e. acquiescent speaking up) to affirm leadership support or express justifications of behaviour out of fear of possible negative consequences (i.e. defensive speaking up). Such explanations remain hypotheses for further research as our instrument does not measure the distinct subtypes of speaking up. Another possible explanation is rooted in a different perspective on the collectivist nature of the Chinese society (Hofstede, 1980). Team members with high power distance orientation readily accept the unequally distributed power between leaders and members and might, therefore, feel less responsible for team functioning and outcomes. Hence, these team members can speak their minds more freely. However, team members with low power distance orientation who perceive a shared responsibility may be less outspoken with an eye towards consequences to preserve harmony, which is an important value in the collectivist Chinese culture (Cardon & Scott, 2003; Hofstede, 1980). These possible explanations leave much space for future research to explore the nature of the relationship between power distance orientation and the various forms of speaking up, in relation to outcomes in China's rural hospitals and in other settings with high power distance.

Second, the positive relationship between leader-member perceived similarity and silence also contradicts our hypothesis. Different from the instrument measuring speaking up behaviour within the team (Morrison et al., 2011; van Dyne & LePine, 1998), the measurement for silence includes several items which explicitly regard the interaction between a team member and the leader (Detert & Edmonson, 2011; Guenter et al., 2017; Mignonac et al., 2018). The social identity theory (Tajfel, 1974) and self-categorisation theory (Turner, 2010) suggest that team members might categorise leaders

who are similar to themselves as “ingroups”. The concept of “ingroups” facilitates the establishment of close interpersonal relationships and thus may prevent team members from commenting on similar leaders in front of others, which may also be attributed to the Chinese cultural elements “harmony” and “saving face” (Cardon & Scott, 2003). Conversely, team members may experience less restraint to express their discontent to dissimilar leaders (“outgroups”) and therefore be less likely to remain silent with them.

In line with extant literature, speaking up is found to be positively associated with the two outcomes considered, perceived quality of care and job satisfaction. Speaking up is also confirmed to mediate the relationships between team inputs and outcomes. By contrast, the findings do not show a significant relationship between silence and outcomes at the level of individual team members as hypothesised. This might be explained by the difficulty to distinguish whether a silent person is holding back or has no information to share. At the team-level, however, the multilevel models reveal that silence is negatively related to perceived quality of care and to job satisfaction when leader-member perceived similarity is the independent variable. This finding might reveal a downside of “ingroups” causing team members to keep a protective silence with similar leaders because they are “ingroups” (Tajfel, 1974; Turner, 2010). When team members remain silent on perceived quality of care and job satisfaction, an important relationship between team communication and outcomes is lost.

Morrison’s (2023) review of research on employee voice and silence in the past decade indeed shows there is limited evidence on the outcomes of silence. Most of the outcomes researched are emotion-related outcomes such as burnout and anger. An exception is Y. Wang & Hsieh’s study (2014) which finds that individual-level acquiescent silence is negatively related to job satisfaction. Similar to the multidimensionality of speaking up, silence can also be divided into three subtypes: acquiescent, defensive and prosocial silence (van Dyne et al., 2003). Healthcare professionals may, for instance, remain silent to protect anonymity of fellow team members (i.e. prosocial silence) or to conceal errors made by themselves (i.e. defensive silence). To provide more evidence on silence, future research can investigate the subtypes of silence and their antecedents and outcomes.

Additional to the hypothesis we tested, there are two other interesting findings. One is the positive correlation between speaking up and silence, which further confirms that they are two distinct constructs rather than a pair of opposite behaviours. The other interesting finding is that healthcare professionals from multidisciplinary teams have lower job satisfaction compared to those from monodisciplinary team, which is especially relevant as multidisciplinary teams are increasingly important in rural Chinese hospitals and elsewhere.

### *Limitations*

First, this study includes four hospitals, and may therefore not depict a representative picture of all rural Chinese hospitals. Second, we were not able to calculate the response rate as the exact number of persons that have received the link of the questionnaire is not known. Third, all data were collected with the same type of respondents (i.e. healthcare professionals) and methods (i.e. survey), which may create common source and method biases. Fourth, this study is a cross-sectional study, preventing us from claiming causality of the relationships among the measured variables.

## CONCLUSION

Speaking up plays an important role in transmitting the impact of leader-member relationships (i.e. leader-member perceived similarity and power distance orientation) to team outcomes (i.e. perceived quality of care and job satisfaction), while silence shows a relatively negligible role in team functioning in rural Chinese hospitals. Hospital management may seek to form teams in which leaders and members are relatively similar and to promote team members' power distance orientation with the purpose to stimulate speaking up behaviour and, subsequently, improve team effectiveness. Future research into the subtypes of speaking up and silence and their antecedents and outcomes in rural China and elsewhere is called for.

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# 6

# Are perceived similarity and multidisciplinarity associated with coordination and quality of care? A cross-sectional study from rural China

Wang, H., Buljac-Samardzic, M., van Wijngaarden, J., & van de Klundert, J. Are perceived similarity and multidisciplinarity associated with coordination and quality of care? A cross-sectional study from rural China. (submitted)

## ABSTRACT

**Introduction**: The World Health Organization recommends improving the quality of care in rural areas of developing countries by enhancing teamwork. Effective teamwork is especially essential for hospital care delivered to multimorbid patients, which requires multidisciplinary coordination and collaboration. However, evidence on teamwork in hospitals is mostly from urban hospitals and developed countries, leaving team functioning in rural hospitals in developing countries largely under-researched. The distinctive contextual characteristics of rural areas in developing countries, such as increased diversity, impact teamwork dynamics. To advance the understanding of teamwork in hospitals in rural areas of developing countries, this study investigates the relationships among perceived similarity, multidisciplinarity, coordination and perceived quality of care in rural Chinese hospitals.

**Methods**: We conducted a quantitative study via online survey in four rural Chinese hospitals from different provincial administrative regions. 1,017 respondents including doctors, nurses and other healthcare professionals provided valid responses. A multilevel moderated mediation model was used for data analysis.

**Results**: Perceived similarity is positively related to coordination, which in turn leads to higher perceived quality of care. Coordination partially mediates the relationship between perceived similarity and perceived quality of care. However, multidisciplinarity does not moderate the effect of perceived similarity on coordination.

**Conclusions**: Perceived similarity can promote coordination and subsequently perceived quality of care. Multidisciplinarity does not moderate the relationship between perceived similarity and coordination, and further research into the role of multidisciplinarity is called for. Hospital management may leverage the advantage of similarity to form teams whose members perceive each other as similar. The functioning of teams perceived as less similar may require additional effort to promote coordination and perceived quality of care. Such challenges caused by dissimilarity are especially relevant in the process of workforce strengthening with the aim of quality improvement towards universal health coverage in rural areas of developing countries.

**Keyword**: teamwork, perceived similarity, multidisciplinary team, coordination, quality of care

## INTRODUCTION

The World Health Organization (WHO) has impelled access to high quality care globally, with special urgency for rural areas of developing countries such as rural China (World Health Organization et al., 2018; World Bank & World Health Organization, 2019). Effective teamwork between different healthcare professionals is pivotal to the delivery of high quality care (Chopra et al., 2008; Kohn et al., 2000; Rosen et al., 2018), especially for multimorbid patients whose care requires intensive coordination and multidisciplinary collaboration (Kianfar et al., 2019; Trosman et al., 2016; World Health Organization et al., 2018). Hence, the promotion of teamwork to improve the quality of care in developing countries is recommended by the WHO (World Health Organization et al., 2018; World Bank & World Health Organization, 2019).

The large body of literature evidencing the essential role of teamwork in healthcare (e.g. Korner et al., 2016; Lemieux-Charles & McGuire, 2006; Reader et al., 2009) is mostly from developed countries. The evidence from rural areas of developing countries has remained scant, despite the difficulties in providing access to high quality care being larger in such contexts (World Health Organization, n.d.). The relatively low economic development and scarcity of (highly educated) healthcare professionals in these areas cause unique context-related challenges for the hospital workforce that influence team functioning. For instance, Wang et al. (2023) find that the workforce in rural Chinese hospitals is predominantly local, resulting in a shared life background and cultural values and perceived similarity. While this similarity appears conducive to team functioning, it may cause nonlocals to experience difficulties to integrate into the teams, thus impeding team processes such as coordination and collaboration. Such integration difficulties may ultimately cause nonlocals to leave (Van de Klundert et al., 2018). The perceived dissimilarity thus may complicate efforts of rural Chinese hospitals to implement policy recommendations to relieve human resource shortages and strengthen team functioning and quality of care (World Health Organization, 2010).

In general, building teams with the competences required to provide higher quality care often necessitates attracting and retaining talent that increase team diversity, for example, in the form of generational diversity, educational diversity, professional diversity and cultural diversity. Despite the potential benefits of team diversity such as promoting innovation and integrating complementary knowledge (Liberati et al., 2016; Mitchell & Boyle, 2015), diversity also introduces ambiguity to team functioning. However, little appears to be known about resulting challenges for team functioning, as mentioned above, which have been reported more widely in rural settings in developing countries (Wang et al., 2023; Lehmann et al., 2008; Van de Klundert et al., 2018; Saraceno

et al., 2007). Therefore, this research aims to advance understanding of the role of (dis) similarity in healthcare team functioning through a study in rural Chinese hospitals.

Shemla et al. (2016) view perceived (dis)similarity as one of the three forms of perceived diversity and define it as individual perception of (dis)similarity to other team members regarding deep-level attributes (e.g. attitudes, values and beliefs). We adopt their embedding of dissimilarity as a form of diversity and consider dissimilarity and similarity to relate to the same construct be it from opposite perspectives (as further operationalised below).

Empirical evidence predominantly shows the benefits of perceived similarity to a variety of team outcomes such as higher job satisfaction, team commitment and team efficiency and lower turnover intention (Jansen & Searle, 2021; Shemla et al., 2016). This evidence largely disregards the role of team processes in explaining how team inputs impact team outcomes, as posited by commonly adopted input-process-outcome healthcare teamwork models (Korner et al., 2016; Lemieux-Charles & McGuire, 2006; Reader et al., 2009). The extant literature, however, presents little evidence on the relationship between the team input perceived diversity (or, more specifically, dissimilarity) and team processes and is mainly from developed countries. Shemla et al. (2016) state that perceived value dissimilarity is negatively associated with team members' involvement in task-related team processes such as collaborative decision-making and information exchange, without reaching outcomes. Triana et al.'s meta-analysis (2021) shows that deep-level diversity in culture, value and personality transmits negative influences to team task performance via processes such as information sharing, collaboration and coordination.

Coordination exhibits a prominent position among team processes in healthcare, and particularly to improve quality of care for increasingly prevalent chronic and oncological conditions under which task interdependence is high (Kianfar et al., 2019; Trosman et al., 2016). The understanding of the antecedents of coordination mostly lies at the theoretical level. Several reviews summarise frameworks related to care coordination, some of which include well-known healthcare teamwork models (e.g. Lemieux-Charles & McGuire, 2006; Reader et al., 2009). These reviews propose a series of factors that impact coordination, such as care setting, team factors, healthcare professionals' characteristics, cultural factors and task characteristics (McDonald et al., 2007; Peterson et al., 2019; van Houdt et al., 2013). These proposed relationships, however, are only scarcely supported by empirical evidence. In view of the apparent importance of perceived similarity, we propose and investigate the association between perceived (dis) similarity and coordination.

The introduction of multidisciplinary teams to address the needs associated with the growing prevalence of multimorbid conditions makes coordination in healthcare more challenging (Hartgerink et al., 2014; Tumiene et al., 2022; World Health Organization et al., 2018). The task complexity in multidisciplinary teams increases difficulties in orchestration and synchronisation of different tasks. Discrepancies in disciplinary perspectives on patient treatment may produce obstacles to teamwork (Liberati et al., 2016). These challenges complicate team functioning and negatively impact the relationship between team inputs (e.g. perceived similarity), processes (e.g. coordination) and finally outcomes. As the Chinese government emphasises the establishment of multidisciplinary teams for patient-centred care (World Bank & World Health Organization, 2019), we especially research how multidisciplinarity impacts the relationships among perceived similarity, coordination and quality of care in rural Chinese hospitals, which cover the health needs of nearly half a billion rural Chinese citizens (National Bureau of Statistics of China, 2023).

## HYPOTHESES DEVELOPMENT

### *Perceived similarity and coordination*

Perceived similarity in this study refers to individuals' perceptions of the similarity in underlying attributes such as values, attitudes and beliefs between team members, which is also called deep-level similarity (Shemla et al., 2016). It is different from surface-level similarity which is related to demographic characteristics such as age, gender and race. Research shows that deep-level similarity plays a more important role in team functioning than surface-level similarity (Kang et al., 2006; van Emmerik & Brenninkmeijer, 2009).

Coordination refers to harmonising and synchronising team members' tasks and activities to fulfil the goal of the team and is part of teamwork processes and interaction (Cropanzano et al., 2011; Lechler, 2001). The similarity attraction theory suggests that people are more willing to interact with those they perceive similar to themselves and less likely to work with dissimilar ones (Byrne, 1971). Triana et al.'s meta-analysis (2021) confirms that deep-level diversity is negatively related to team process performance (e.g. regarding information sharing, collaboration and coordination). Srikanth et al.'s (2016) review shows that deep-level diversity complicates the coordination of information and task completion within teams. Accordingly, we posit that when team members perceive others as more similar to themselves, they will find it easier to orchestrate the tasks between each other and therefore perceive coordination to be better. Thus, we propose:

**Hypothesis 1**: Perceived similarity is positively related to coordination.

### *The moderating role of multidisciplinarity*

In contrast to monodisciplinary teams, multidisciplinary teams consist of members from multiple disciplines. The tasks performed in multidisciplinary teams are typically more complex. For example, multidisciplinary oncological teams usually include healthcare professionals from disciplines such as oncology, surgery, radiology and pathology, and diagnose and treat patients through a complex care pathway (Lamb et al., 2011; Soukup et al., 2018). Due to the task complexity, multidisciplinary teams have to synchronise and orchestrate the tasks and activities across team members from various disciplines who have complementary roles. The differences in roles and tasks may create boundaries and conflicts, even between team members who perceive other team members as similar (Liberati et al., 2016). This in turn may impede collaboration (Downes et al., 2021) and pose barriers to the coordination of tasks and activities, despite perceived similarity among team members. Therefore, the positive relationship between perceived coordination and similarity may be less pronounced in multidisciplinary teams:

**Hypothesis 2**: Multidisciplinarity moderates the relationship between perceived similarity and coordination such that this relationship is weaker in multidisciplinary teams than in monodisciplinary teams.

### *Coordination and perceived quality of care*

The reviews presenting healthcare teamwork models build the connection between coordination and outcomes. For example, Lemieux-Charles & McGuire's review (2006) summarises the findings of field studies in healthcare and presents a positive relationship between coordination and subjective team effectiveness (e.g. perceived task outcomes and well-being). Reader et al.'s (2009) review finds positive perceived coordination is associated with reduced error rates. In addition, other empirical evidence also supports the benefit of coordination to healthcare related outcomes. Bosch et al. (2009) conclude that improved coordination is positively related to patient outcomes such as lower complication rates, less functional decline and higher self-rated health. Castelao et al.'s (2013) systematic review also states that coordination is beneficial for effective cardiopulmonary resuscitation performance. Such empirical evidence supports a positive relationship between coordination and perceived quality of care. Therefore, we propose:

**Hypothesis 3**: Coordination is positively related to perceived quality of care.

### *The mediating role of coordination*

Based on the teamwork models (Korner et al., 2016; Lemieux-Charles & McGuire, 2006; Reader et al., 2009), team processes mediate the impacts of inputs on outcomes. This mediation is confirmed by empirical findings. For example, Hu & Liden (2015) find that prosocial motivation (input) is positively associated with team performance (outcome) via team cooperation (process). Pangil & Chan (2014) present the mediating role of knowledge sharing (process) in the relationship between personality-based and institutional-based trust (inputs), and virtual team effectiveness (outcome). In the same spirit, we posit that team members who perceive themselves as similar to other team members find it easier to interact with fellow team members and perceive coordination to be better. Moreover, we posit that the perceived better coordination subsequently contributes to higher perceived quality of care. Perceived similarity may, however, also impact outcomes via other team processes such as collaboration and information sharing (Triana et al., 2021). Therefore, we propose:

**Hypothesis 4**: Coordination partially mediates the relationship between perceived similarity and perceived quality of care.

## METHODS

### *Sample and procedure*

As the study was embedded in rural China, we approached seven rural Chinese hospitals via the Health Human Resources Development Centre of the National Health Commission of China and the County Health Media. After we explained the purpose of this study to the hospital presidents of these seven hospitals, four of the hospitals agreed to participate in our study. These four participating hospitals are located in four different provincial-level administrative regions and together employ a workforce of 3,500, including about 1,000 doctors and 1,700 nurses. Online questionnaires were disseminated to doctors, nurses and other healthcare professionals from these four hospitals via the Chinese survey platform “Wen Junan Xing” in October 2022. All team leaders were excluded from the study.

This study was approved by the Research Ethics Review Committee of Erasmus School of Health Policy and Management, Erasmus University Rotterdam (No. ETH2122-0807). Consent was obtained prior to the data collection from respondents.

### *Measures*

***Perceived similarity***. William et al.'s (2007) 6-item measure, adapted from Liden et al. (1993), was used to measure the perceived similarity between team members (Cronbach's α=0.97).

***Coordination***. A 3-item measure, developed by Lechler (2001) and adapted by Song et al. (2019), was used to measure individuals' perceptions of coordination within a team (Cronbach's α=0.98).

A 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) was used to rate the items of perceived similarity and coordination.

***Perceived quality of care***. We measured perceived quality of care via a single-item outcome indicator (Schmalenberg & Kramer, 2008; Stalpers et al., 2017) using a scale from 1 (very bad) to 10 (very good).

***Multidisciplinarity***. We used a dummy variable to indicate multidisciplinarity. Teams with only one discipline (i.e. monodisciplinary teams) were set the value of 0, while the value of 1 was assigned to teams including more than one discipline (i.e. multidisciplinary teams). As multidisciplinarity is a team-level variable, respondents from the same team were assigned the same value (i.e. 0 or 1).

***Control variables***. Gender and team tenure were included as control variables in this study based on the significance to the mediator and dependent variables and previous research on team functioning (Herdman et al., 2017; Hu & Liden, 2015).

The measurements of perceived similarity, coordination and perceived quality of care are listed in Appendix 4. All the measures were translated from English into Chinese by the standard translation/back-translation technique (Behling & Law, 2000). The average scores per measure for each respondent form the individual measurements of member perceived similarity, coordination and perceived quality of care.

### *Analysis*

Data analyses were conducted via SPSS 29 and AMOS 28. Good factor loadings (ranging from 0.89 to 0.99) were shown for perceived similarity and coordination in confirmatory factor analysis. The two-factor model (i.e. perceived similarity and coordination are separate factors) shows a significantly better model fit ($\chi^2(26)=627.89$, CFI=0.96, TLI=0.94, RMSEA=0.15, SRMR=0.03) compared to the one-factor model (i.e. perceived similarity and

coordination are combined into one factor; $\chi^2(27)=4380.51$, $p<0.01$, CFI=0.70, TLI=0.60, RMSEA=0.40, SRMR=0.11).

The fact that respondents were nested within teams, which were further nested within hospitals, results in the dependency of observations. Furthermore, the SPSS mixed model showed significant between-group variance for perceived quality of care, while the variances across hospitals were not significant. Therefore, we conducted multilevel moderated mediation analysis using the MLmed macro in SPSS (Rockwood, 2017). "Perceived similarity", "coordination" and "perceived quality of care" were level-1 independent variable, mediator and dependent variable, respectively. "Multidisciplinarity" was a level-2 moderator, while the control variables gender and team tenure were level-1 covariates. In addition, we included random intercepts and slopes in the analysis as the intercepts and slopes were considered to vary across groups (Bell et al., 2019). Only level-1 results will be reported and discussed as our hypotheses were all built at level 1 (Collins & Martinez-Moreno, 2022). However, results of both levels are presented in the table.

## RESULTS

1,017 respondents from 300 teams (i.e. 248 monodisciplinary teams and 52 multidisciplinary teams) provided valid responses. The average age and team tenure of these respondents are 32.25 years (median: 31.00, standard deviation: 7.95) and 6.67 years (median: 5.00; standard deviation: 6.19), respectively. Doctors account for 37.95% of the respondents (close to the national data 38.04%), while the proportion of nurses (58.01%) is higher than that in Chinese hospitals (44.81%) (National Health Commission, 2023). The demographic characteristics of the respondents are listed in Table 1.

*Table 1. Demographic characteristics*

| | Number of people (Percentage) |
|---|---|
| **Age*** | |
| <=30 | 485 (47.69%) |
| 31-40 | 366 (35.99%) |
| 41-50 | 123 (12.09%) |
| >=51 | 38 (3.74%) |
| **Gender** | |
| Male | 204 (20.06%) |
| Female | 782 (76.89%) |
| Prefer not to say | 31 (3.05%) |
| **Local or non-local** | |
| Local | 884 (86.92%) |
| Non-local | 133 (13.08%) |
| **Profession** | |
| Doctors | 386 (37.95%) |
| Nurses | 590 (58.01%) |
| Other healthcare professionals | 41 (4.03%) |
| **Professional title** | |
| Senior | 25 (2.46%) |
| Deputy senior | 69 (6.78%) |
| Intermediate | 269 (26.45%) |
| Junior | 654 (64.31%) |
| **Education background** | |
| Master | 23 (2.26%) |
| Bachelor | 717 (70.50%) |
| Lower than bachelor | 277 (27.24%) |

** Due to missing values for age, the total number of people per age group is lower than the number of respondents.*

The correlation matrix (Table 2) shows a strong and significant correlation between perceived similarity and coordination ($r$=0.70, $p$<0.01). In addition, significant, moderate, correlations are found between perceived similarity and perceived quality of care ($r$=0.36, $p$<0.01) and between coordination and perceived quality of care ($r$=0.40, $p$<0.01). Full collinearity test confirms there are no serious multicollinearity issues in this study; the values of variance inflation factors for the control variables, independent variable and mediator range from 1.00 to 1.92 (Kim, 2019).

*Table 2. The correlation matrix of all variables*

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Gender (1=female) | 1.00 | | | | | |
| 2. Team tenure | -0.15** | 1.00 | | | | |
| 3. Multidisciplinarity | -0.03 | -0.02 | 1.00 | | | |
| 4. Perceived similarity | 0.07 | -0.01 | -0.04 | 1.00 | | |
| 5. Coordination | 0.15** | 0.00 | -0.04 | 0.70** | 1.00 | |
| 6. Perceived quality of care | 0.15** | -0.09** | -0.09** | 0.36** | 0.40** | 1.00 |

***: p<0.01*

Table 3 shows the results of the multilevel moderated mediation analysis. Perceived similarity is significantly and positively related to coordination ($\beta$=0.57, $p$<0.01). However, multidisciplinarity does not moderate the relationship between perceived similarity and coordination ($\beta$=0.01, $p$>0.05). Furthermore, coordination is also significantly and positively associated with perceived quality of care ($\beta$=0.42, $p$<0.01) and partially mediates the relationship between perceived similarity and perceived quality of care ($\beta$=0.24, $p$<0.01) as there is a significantly direct positive relationship between these two variables ($\beta$=0.21, $p$<0.01) (MacKinnon, 2012).

*Table 3. Multilevel moderated mediation analysis*

| | Coordination | Perceived quality of care |
|---|---|---|
| ***Fixed effects*** | | |
| **Within-group (Level 1)** | | |
| Intercept | 5.74** | 6.43** |
| **Perceived similarity** | 0.57** | 0.21** |
| **Moderation (Perceived similarity * Multidisciplinarity)** | 0.01 | - |
| **Coordination** | - | 0.42** |
| Gender | 0.27** | 0.22 |
| Team tenure | -0.00 | -0.02* |
| **Between-group (Level 2)** | | |
| **Multidisciplinarity** | -0.01 | - |
| **Perceived similarity** | 0.64** | 0.26** |
| **Moderation (Perceived similarity * Multidisciplinarity)** | 0.03 | - |
| **Coordination** | - | 0.40** |
| Gender | 0.24** | 0.32 |
| Team tenure | 0.00 | -0.02 |
| **Mediation (Level 1)** | - | 0.24** |
| **Mediation (Level 2)** | - | 0.26** |
| ***Random effects (Variance)*** | | |
| Intercept | 0.03 | 0.25** |
| Slope (Perceived similarity~) | 0.09** | 0.20** |
| Slope (Coordination~) | - | 0.11 |

**: p<0.05; **: p<0.01*

## DISCUSSION

This study investigates the relationship among perceived similarity, multidisciplinarity, coordination and perceived quality of care in rural Chinese hospitals. In line with our hypotheses, healthcare professionals perceiving themselves more similar to their team members perceive better coordination and higher quality of care. Moreover, coordination partially mediates the relationship between perceived similarity and perceived quality of care.

Previous literature on perceived diversity and (dis)similarity presents little evidence on the connection among perceived similarity, processes and outcomes at individual level, and (to the best of our knowledge) none in healthcare settings in rural areas of developing countries (Jansen & Searle, 2021; Shemla et al., 2016; Triana et al., 2021). This study confirms that perceived similarity is beneficial to coordination and consequently

perceived quality of care, adding empirical evidence to the antecedents of coordination and the relationship between team inputs and processes in those theoretical models mentioned in the introduction. This study particularly provides quantitative supports for Wang et al.'s (2023) qualitative finding that similarity acts as a context-specific advantage for team functioning in rural Chinese hospitals. Nevertheless, the downside of perceived similarity should not be ignored. Lack of perceived dissimilarity may negatively impact innovation, creativity and decision-making effectiveness (Jansen & Searle et al., 2021; Srikanth et al., 2016). Moreover, our findings indicate that the strengthening of the workforce as required to achieve the goal of universal health coverage may adversely impact coordination and quality of care if it introduces dissimilarity. Therefore, future organisational research should take the duality of perceived (dis)similarity as a determinant of the effectiveness of workforce strengthening into account.

The influence of perceived similarity on coordination may depend on contextual characteristics (Shemla et al., 2016). In this regard, it may be considered as surprising that we did not find evidence on a moderating role of multidisciplinarity in the relationship between perceived similarity and coordination. This might be explained by the job demands-resources model. Contextual factors can be divided into job demands, which require sustained efforts, consume energy and are associated with negative performance, and job resources, which are conducive to achieving team goals and counteract the negative effects of job demands (Jansen & Searle, 2021; Xanthopoulou et al., 2007). Demands and resources exert distinct impacts on team functioning. The task complexity encountered in multidisciplinary teams may play a role as a job demand and impede the positive impact of perceived similarity on coordination. In that case, the non-significant finding implies that other job resources offset the hypothesised negative moderating effect of multidisciplinarity. For example, the diversity of knowledge, skills and perspectives that healthcare professionals from different disciplines bring into multidisciplinary teams may well improve team functioning (Oborn & Dawson, 2010; Srikanth et al., 2016). Furthermore, the governmental and hospital support for the functioning of multidisciplinary teams, for instance, in the form of team training, can also be seen as a job resource that facilitates teamwork. Future research may consider potential job demands and resources to comprehend the role of multidisciplinarity in team functioning.

Our findings suggest some practical implications for hospital managers and team leaders. Homogeneous teams can utilise the advantages of similarity to coordinate team yet may need additional management efforts to promote innovation and creativity to improve quality of care. The job demands-resources model (Jansen & Searle, 2021; Xanthopoulou et al., 2007) suggests that heterogeneous teams possess strengths

derived from diversity-driven resources such as access to more diverse information and knowledge. However, these more heterogenous teams may require explicit management efforts to improve coordination and quality of care (Van Knippenberg et al., 2020). This may especially apply to multidisciplinary teams. More generally, hospital administrators should be aware of the challenges caused by dissimilarity as they are likely to evolve when strengthening the workforce to improve quality of care on the path towards universal health coverage. .

Although this study was conducted in rural Chinese hospitals, the findings may have validity in other contexts, and particularly for hospitals in rural areas in other developing countries (Grimes et al., 2011; Lehmann et al., 2008; Saraceno et al., 2007). The study may form a starting point for the evidence base on the role of (dis)similarity in the efforts to strengthen the hospital workforce in pursuit of universal health coverage.

### *Limitations*

First, the exact number of people receiving the questionnaire is unknown, preventing us from calculating the response rate. Second, the cross-sectional study design cannot claim causal relations among all the variables. Third, the data were collected with the same respondents (i.e. healthcare professionals) via the same research method (i.e. survey), which may introduce common-source and common-method bias.

## CONCLUSION

Perceived similarity can promote coordination, which is beneficial for perceived quality of care. Moreover, the team process coordination plays a mediating role between the team input perceived similarity and the team outcome perceived quality of care. Multidisciplinarity does not moderate the relationship between perceived similarity and coordination, and further research into the role of multidisciplinarity is called for. Hospital management may leverage the advantage of similarity to form teams whose members perceive each other as similar. The functioning of teams perceived as less similar may require additional effort to promote coordination and perceived quality of care. Such challenges caused by dissimilarity are especially relevant in the process of workforce strengthening with the aim of quality improvement towards universal health coverage in rural areas of developing countries.

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# 7

## Discussion & Conclusion

This PhD thesis aims to advance the understanding of team functioning in rural Chinese hospitals, specifically county-level hospitals in less affluent areas. With this aim, this thesis answers five research questions, summarised as follows.

## SUMMARY OF THE FINDINGS

***(1) What do we know about teamwork in Chinese hospitals? (Chapter 2)***

The systematic review summarises the findings of 70 included articles in two categories: teamwork components and team interventions. Results about teamwork components (i.e. team input, process and outcome) and the relationships among them are mostly inconclusive. The literature on improving teamwork predominantly focuses on redesigning team input factors in Chinese hospitals, compared to the main focus on facilitating team processes in Western hospitals through training and tools. The establishment and implementation of multidisciplinary teams in Chinese hospitals have received special attention in the quality improvement realm, apparently with promising effects. This finding matches the goal of the Chinese health reforms, which advocate patient-centred integrated care to build high-quality care delivery. In addition to these main findings, we find that nearly all included studies were conducted in urban hospitals and that more than 70% of these studies report results from national, provincial and prefecture-level hospitals. These insights leave much space for exploring team functioning in rural Chinese hospitals at the county level and below, which provide care to more than 477 million rural Chinese citizens (National Bureau of Statistics of China, 2024). Rural county-level hospitals form the research context of interest for the remainder of this PhD thesis.

***(2) Which factors influence team functioning, and which interventions are implemented to improve team functioning in county-level hospitals in less affluent areas of China? (Chapter 3)***

Due to the scant evidence from rural Chinese hospitals, we explore the factors influencing team functioning and interventions for improving team functioning in county-level hospitals in less affluent areas of China via 30 semi-structured interviews. The five main factors identified are “stuck in the middle”, local county setting, difficulty in attracting and retaining talent, strong focus on task design and strong focus on leadership. “Stuck in the middle” refers to the requirement for county-level hospitals to provide extensive care for all types of patients while facing resource and reputation challenges that complicate care provisioning and team functioning in particular. The

local characteristics can not only facilitate communication due to shared backgrounds but also produce integration difficulties for non-local employees who are attracted to strengthen the healthcare workforce. The aforementioned reputation of county-level hospitals and local characteristics hinder the attraction and retention of proficient healthcare professionals, subsequently influencing team performance. In addition, task design (e.g. monodisciplinary mode and optimal team composition), leaders' characteristics (e.g. expertise, personality and managerial skills) and appropriate leadership style (e.g. managerial delegation) are seen as crucial for team functioning in county-level hospitals. These five main factors provide insights for proposing research questions 3 to 5.

To attenuate the scarcity of highly skilled healthcare professionals, county-level hospitals take measures to recruit talent, such as increasing salaries, providing learning opportunities and fast-track promotion. The increased recruitment introduces diversity into teams, such as generational diversity, which may not only benefit team functioning by injecting diverse knowledge and perspectives but also impede communication and collaboration between team members with different backgrounds. In alignment with the findings of Chapter 2, interventions for monodisciplinary teams mainly focus on (re) designing teams, for example, changing leaders, changing members' roles and inviting external experts. However, process interventions such as simulation training and continuous process improvement will become even more valuable as multidisciplinary teams are widely established and implemented in county-level hospitals.

***(3) How do generational diversity and perceived similarity influence speaking up, silence and knowledge sharing in rural Chinese hospitals? (Chapter 4)***

Because of the influx of young healthcare professionals in recent years, generational diversity has become significant among the healthcare workforce in rural Chinese hospitals. The opportunities and challenges brought by generational diversity may complicate team functioning, which motivated us to conduct a cross-sectional survey including 841 healthcare professionals from 248 monodisciplinary teams in four rural Chinese hospitals to investigate the relationships among generational diversity, perceived similarity and interactive teamwork behaviour (i.e. speaking up, silence and knowledge sharing). We find that team members perceiving themselves as more similar to other members are more likely to speak up and share knowledge within teams. Furthermore, perceived similarity is found to be significantly positively associated with silence.

Contrary to our hypotheses, generational diversity is not significantly associated with perceived similarity nor with any of the three teamwork behaviours (i.e. speaking up, silence and knowledge sharing). Therefore, perceived similarity does not mediate the relationship between generational diversity and teamwork behaviours. These findings indicate that increased generational diversity is not associated with team behaviour and functioning. Nonetheless, similarity does matter for team functioning. One should, therefore, be aware that extra management efforts may be needed to mitigate the negative effects of decreased perceived similarity that can be potentially caused by several human resource management strategies, such as increasing workforce diversity.

***(4) How do leader-member perceived similarity and power distance orientation influence perceived quality of care and job satisfaction via speaking and silence in rural Chinese hospitals? (Chapter 5)***

Leaders' roles and interactions with members in team functioning are stressed in rural Chinese hospitals. The context of these hospitals presents unique features that may influence the leader-member relationships. For instance, most team members and leaders are locals with shared backgrounds and, therefore, are likely to perceive each other as similar and to build close interpersonal relationships. This phenomenon may cause healthcare professionals not to perceive a substantial power distance within teams even though power distance is traditionally high in rural China. We investigated the relationships among leader-member perceived similarity, power distance orientation, speaking up, silence, perceived quality of care and job satisfaction using cross-sectional survey data from 1,017 healthcare professionals from 300 teams (i.e. 248 monodisciplinary teams and 52 multidisciplinary teams) in four rural Chinese hospitals.

When team members perceive themselves as more similar to their leaders or have a higher power distance orientation, they are both more likely to speak up and to keep silent. In addition, more speaking up behaviour is related to better perceived quality of care and higher job satisfaction, while silence is not associated with these two outcomes. Therefore, speaking up rather than silence transmits the impacts of leader-member perceived similarity and power distance orientation to team performance. These findings may help hospital management in rural Chinese hospitals form teams within which leaders and members are relatively similar or implement interventions to promote speaking up behaviour where the similarity between leaders and members is low.

***(5) How do perceived similarity and multidisciplinarity influence coordination and perceived quality of care in rural Chinese hospitals? (Chapter 6)***

Multidisciplinary teams receive more attention in rural Chinese hospitals than before due to the promotion of integrating diverse knowledge and perspectives from multiple disciplines to improve the quality of care as part of the Chinese health reforms. However, introducing these teams might also create barriers to communication and coordination across disciplines, complicating team functioning. To further investigate the role of multidisciplinarity in team functioning, we collected cross-sectional survey data from 1,017 healthcare professionals working in 300 teams (i.e. 248 monodisciplinary teams and 52 multidisciplinary teams) in four rural Chinese hospitals to address the relationships among perceived similarity, multidisciplinarity, coordination and perceived quality of care in these hospitals.

We find that team members perceiving themselves as more similar to other members are more likely to perceive a higher level of coordination and, subsequently, a better quality of care. This finding confirms the mediating role of coordination in the relationship between perceived similarity and perceived quality of care. Whether a team includes a single or multiple disciplines does not influence the relationship between perceived similarity and coordination. Due to the importance of similarity in team functioning, administrators may leverage the advantage of perceived similarity while making explicit management efforts for the teams in which the similarity between team members is low to promote coordination and, subsequently, the quality of care.

## OVERARCHING THEMES

Based on the main findings above, this thesis elicits three overarching themes that deserve further discussion. For each of these themes, we propose corresponding implications for future research.

### *Speaking up and silence behaviour*

Speaking up and silence are widely researched in almost all industries and emphasised in healthcare due to their importance for patient safety (Okuyama et al., 2014; Szymczak, 2016). Some researchers treat speaking up and silence as two poles of a continuum in which a high-level of speaking up equals a low-level of silence and vice versa (Ashford et al., 2009; Morrison, 2011). Another perspective is that speaking up and silence should be viewed as two separate behaviours that can coexist (Sherf et al., 2021; van Dyne et al., 2003). People who speak up on certain issues may also keep silent about other

issues. This thesis shows a positive correlation between speaking up and silence and positive associations of these two behaviours with a series of antecedents (i.e. perceived similarity, leader-member perceived similarity and power distance orientation). These findings corroborate the perspective of separating the two behaviours (i.e. speaking up and silence).

Morrison (2014, 2023) summarises substantial evidence on the antecedents and outcomes of speaking up and silence. For example, proactive personality and leaders' support and openness promote speaking up behaviour, while psychological detachment and employees' lacking power will drive them to keep silent (Morrison, 2014, 2023). Research into outcomes mainly focuses on speaking up and shows inconclusive findings under different conditions while leaving outcomes of silence under-researched (Morrison, 2023). Nevertheless, this evidence is predominantly from non-healthcare industries. Based on the extant evidence and our qualitative findings, we test potential antecedents and outcomes in healthcare, specifically in rural China.

To explore relevant antecedents, we hypothesised that perceived similarity and leader-member perceived similarity are positively related to speaking up and negatively to silence, and power distance orientation is negatively associated with speaking up and positively with silence. Although some of these hypotheses were confirmed in the research presented in this thesis, we also found some unexpected falsifications. More interestingly, we find a positive association of perceived similarity and leader-member perceived similarity with silence and a positive association of power distance orientation with speaking up.

Both these results may be explained using subtypes of speaking up and silence. Van Dyne et al. (2003) divide speaking up and silence into three subtypes each (i.e. acquiescent/defensive/prosocial speaking up and acquiescent/defensive/prosocial silence) based on different motives. These subtypes might well fit different preconditions and, for example, explain that team members with high power distance orientation are submissive to and afraid of their leaders. Therefore, these team members might speak up to switch attention to others (i.e. defensive speaking up) or unconditionally express support towards leaders' decisions (i.e. acquiescent speaking up). Likewise, team members who perceive their leaders and other members to be similar to themselves will treat these similar people as "ingroups" and may withhold private and confidential information to protect these "ingroups" (i.e. prosocial silence). However, as we measured speaking up and silence without distinguishing these different subtypes, these hypotheses need to be corroborated by future research which explores subtypes of speaking up and silence and their antecedents. Meanwhile, this thesis adds empirical evidence to the limited

knowledge of antecedents of speaking up and silence in rural Chinese healthcare settings and shows that some of the Western evidence on these topics is not valid in rural China.

Regarding the investigation of outcomes, it is promising that speaking up is conducive to team performance (i.e. perceived quality of care and job satisfaction); however, silence does not show any significant association with these outcomes. The findings regarding silence may reveal the difficulty of distinguishing whether a person withholds ideas or has no constructive ideas to share (Sherf et al., 2021). Despite being non-significant, the results on silence still expands the limited knowledge base on silence in rural Chinese hospitals and provide valuable directions for future research into the outcomes of speaking up and silence. This research direction may help administrators recognise, promote and discourage corresponding subtypes of speaking up and silence to improve team performance.

### *(Dis)similarity and diversity within teams*

The similarity between healthcare professionals facilitates team communication (as highlighted in our qualitative study) because most of the employees in rural Chinese hospitals are locals sharing backgrounds and perceiving each other as similar. However, the increased recruitment in recent years introduces much diversity, such as generational diversity, cultural diversity and educational diversity, which may bring benefits (e.g. diverse knowledge and perspectives) and challenges (e.g. difficulty in communication, collaboration and coordination) to team functioning. The coexistence of similarity and diversity may cause healthcare teams to function differently in rural Chinese hospitals, eliciting a theme worth exploring and discussing.

Similarity is the opposite of dissimilarity, which can be used interchangeably with diversity (Hobman et al., 2004; Jansen & Searle, 2021). Based on the literature, surface-level (dis)similarity is related to demographic characteristics such as age, gender and race, while deep-level (dis)similarity or perceived (dis)similarity is associated with underlying attributes such as values, beliefs, attitudes and norms (Shemla et al., 2016; Williams et al., 2007). It is corroborated by much research that deep-level similarity plays a more crucial role in team functioning than surface-level similarity (Kang et al., 2006; van Emmerik & Brenninkmeijer, 2009); however, evidence on the relationship between surface-level and deep-level similarity and their impacts on team functioning is scant, especially in healthcare settings. To provide more insights for the literature, Jansen & Searle (2021) suggest researching surface-level and deep-level diversity simultaneously. This suggestion motivated us to investigate both surface-level (dis)similarity (i.e. generational diversity and multidisciplinarity) and deep-level (dis)similarity (i.e. perceived similarity and leader-member perceived similarity) in the hospital setting in

specific less affluent rural areas where the exploration of the two types of (dis)similarities is even more limited.

This thesis confirms that perceived deep-level similarity positively influences team processes (i.e. speaking up, knowledge sharing and coordination) and outcomes (i.e. perceived quality of care and job satisfaction). This result is in accordance with most findings from other industries (Jansen & Searle, 2021; Shemla et al., 2016). Nevertheless, the rural Chinese hospital context yielded unforeseen relationships between deep-level perceived similarity and team behaviour. For instance, we hypothesised negative associations of perceived similarity and leader-member perceived similarity with silence while finding positive relationships. In the specific Chinese context, the Chinese cultural values "harmony" and "saving face" may prevent people from publicly commenting and impel them to keep silent towards similar team members ("ingroups") (Cardon & Scott, 2003; Tajfel, 1974; Turner, 2010). This explanation indicates that future research should take context into account to comprehend the effect of deep-level perceived similarity under different contexts.

Unlike the positive association of deep-level (dis)similarity with team functioning, we found no significant relationships with surface-level (dis)similarity. For instance, we expected that generational diversity would introduce intergenerational differences in values into teams and, therefore, reduce the perceived similarity between team members, which subsequently influences team members' behaviour. Contrary to our expectation, generational diversity is found to have no significant associations with deep-level similarity and team processes (i.e. speaking up, silence and knowledge sharing). Moreover, multidisciplinarity does not moderate the relationship between perceived similarity (team input) and coordination (team process). These findings further confirm that surface-level (dis)similarity plays a limited role in team functioning.

The literature illustrates that workforce diversity, mainly related to demographic characteristics (i.e. surface-level attributes), can not only bring diverse knowledge and perspectives into teams and stimulate innovation and creativity but also create communication barriers and interpersonal conflicts (Jansen & Searle, 2021; Van Knippenberg et al., 2020). Following the job demands-resources model, these barriers and conflicts can be seen as job demands which consume energy and may be related to negative outcomes, while diverse knowledge and increased innovation are part of job resources which benefit achieving common goals and may offset the negative impact of job demands (Jansen & Searle, 2021; Xanthopoulou et al., 2007). The influence of surface-level dissimilarity/diversity on team functioning then depends on the demands-resources ratio (Hu et al., 2011; Jansen & Searle, 2021; Xanthopoulou et al., 2007):

when resources surpass demands, surface-level dissimilarity or diversity will positively influence team functioning; otherwise, it may present negative influences. This explanation provides opportunities for future research to include potential job demands and resources when researching the effect of surface-level (dis)similarity. Furthermore, it also reminds hospital management to utilise the resources brought by diversity while decreasing the diversity-related job demands to promote team functioning.

Despite the various hypotheses and efforts, this thesis leaves the question of surface-level diversity constructs (e.g. generations, disciplines, gender and local backgrounds) that cause deep-level perceived (dis)similarity widely open. We have not been able to present relevant antecedents of perceived similarity. Due to the prominent role of deep-level (dis)similarity in team functioning, we call for research exploring the antecedents of deep-level (dis)similarity, which may facilitate tailored management efforts to promote deep-level perceived similarity to improve team functioning and, subsequently, the quality of care.

### *Power distance (orientation)*

Power distance is one of the dimensions from Hofstede's cultural dimensions theory (1980), initially referring to the degree of acceptance of unequally distributed power in organisations by a society (Culpepper & Watts, 1999). However, this term is defined from the societal or country level. In recent decades, many researchers have proposed to research power distance from an individual perspective and developed the construct power distance orientation. Power distance orientation refers to the degree of acceptance of unequally distributed power by an individual. This individually perceived power distance may more accurately capture any relationships with individual behaviour and team performance (Clugston et al., 2000; Culpepper & Watts, 1999; Farh et al., 2007). In alignment with this research trend, this thesis focuses on power distance orientation as there is scant evidence on the role of power distance orientation in team functioning, especially in healthcare settings.

The Chinese society is famous for its high-power-distance nature (Hofstede, 1980). However, large cultural differences exist across the country (Hai-ping et al., 2020), which may weaken the generalisability and validity of conclusions drawn from national cultural values to a specific context in China. Our qualitative study suggests that healthcare professionals working in rural Chinese hospitals do not perceive high power distance within their teams. The shared backgrounds and close interpersonal relationships between leaders and members may attenuate these members' power distance orientation. This explanation also motivated us to investigate the impact of individual

power distance orientation on individual behaviour and team effectiveness in these rural Chinese hospitals, which present unique cultural characteristics.

Based on the cultural dimensions theory (Hofstede, 1980), people with a high power distance orientation tend to be submissive to their leaders and reduce their interactive behaviour within teams. Surprisingly, we found a positive association of power distance orientation with speaking up behaviour. This unforeseen result may indicate that there are other contextual factors influencing team functioning. For instance, with the traditional Chinese cultural value "collectivism" in mind (Hofstede, 1980), team members with high power distance orientation are not only used to the unequal power between leaders and team members but also believe the leaders will make collective and correct decisions and view this as a main responsibility of the leader. Experiencing less responsibility for team matters, these members may feel less restricted to express their ideas freely. As healthcare professionals in rural Chinese hospitals have grown up in the high-power-distance Chinese society, they are accustomed to this hierarchical organisational characteristic and likely to believe that a top-down approach works effectively to achieve better outcomes (Van de Klundert et al., 2020; Wang & Wall, 2007). This reasoning may also support the unexpected benefit of power distance orientation to team functioning in the rural Chinese context. These findings and explanations leave much space for future research into the interaction between power distance orientation and contextual factors and their subsequent influence on team functioning.

## METHODOLOGY REFLECTION

### *Strengths*

This thesis uses multiple methods to answer the research questions stepwise. We first conduct a systematic literature review to comprehend the knowledge of team functioning in Chinese hospitals, establishing a lack of evidence from rural Chinese hospitals. To understand how healthcare teams function in these hospitals, we use semi-structured interviews to explore the factors influencing team functioning and interventions for improving team functioning, which extracted several potential relationships among a series of variables worth researching. These hypothesised relationships are finally tested via cross-sectional surveys. Following this line of research designs, this thesis discloses the veil covering team functioning in rural hospitals step by step and presents relatively strong evidence for hospital management to (re)design necessary team input factors and optimise crucial team processes to improve team performance.

In addition, after confirming the non-significance of dependent variables across the four participating hospitals by preliminary analysis, we conducted multilevel mediation modelling in the three quantitative studies (Rockwood, 2017), which takes the cluster effect of respondents into consideration and separates individual and team-level analysis. This analytic method eliminates bias in coefficient estimation from the conflation of individual and team-level analysis and strengthens the validity and reliability of our findings (Collins & Martinez-Moreno, 2022; Rockwood, 2017).

### *Limitations*

Notwithstanding the strengths mentioned above, this thesis has some limitations. First, the COVID-19 pandemic has severely impacted the whole PhD trajectory. Our initial research design was suspended due to restrictions and measures of COVID-19 containment. Then, we had to switch the direction and design new research. Even after the switch and new start, we still encountered difficulties connecting to hospitals and respondents and collecting data during the COVID-19 pandemic. Thanks to the help of the Health Human Resources Development Centre and the County Health Media, we finally could collect data via online interviews and online surveys. However, this data collection approach has limitations. For example, we were unable to adopt longitudinal designs or intervention studies, which enable to establish the causality of relationships. Therefore, we propose longitudinal and intervention studies for future research to advance the understanding of causal relationships among variables and provide stronger evidence for policymakers and hospital management to improve team functioning.

Second, we use the same method (i.e. cross-sectional survey) to collect data from the same respondents (i.e. healthcare professionals) in the quantitative studies, which may produce common method bias and common source bias. These two biases may influence the reliability of the measurements and the validity of the findings (Kock et al., 2021; Meier & O'Toole, 2012). We conducted full collinearity tests to confirm that our data do not have serious common method bias and multicollinearity issues (J. Kim, 2019; Kock, 2015). Nonetheless, we propose using multiple methods and collecting data from multiple sources in future research to yield more reliable results, such as using a combination of survey data with objective data.

Third, due to the COVID-19 pandemic and pragmatic issues, we only included fifteen hospitals for the semi-structured interviews and four hospitals for the cross-sectional surveys. Although we carefully select those hospitals to maximise representativeness, these numbers may fail to depict a general picture of team functioning in rural Chinese hospitals.

## MANAGERIAL AND POLICY REFLECTION

Strengthening the healthcare workforce (i.e. increasing the recruitment, development, training and retention) in developing countries is a means to reach Sustainable Development Goal 3, which advocates universal health coverage (World Health Organization, n.d.). Due to the benefits and challenges brought to organisations, the diversity issue produced by the increased recruitment in these countries needs to receive more attention than before. It may be valuable for policymakers and hospital management to get the most out of diverse knowledge and perspectives and, meanwhile, take measures to attenuate the negative impact of diversity on team functioning and care delivery. Furthermore, deep-level similarity in values, beliefs and attitudes between diverse healthcare workforce may also be regulated by administrators via interventions, such as cross-cultural training, diversity awareness training and team-building activities (P. Kim, 1999; Shen et al., 2009). The increased deep-level similarity will subsequently promote team functioning and the quality of care. These strategies may benefit hospitals in developing countries the most as these hospitals have been making efforts to strengthen their workforce needed for attaining universal health coverage via increased recruitment.

In addition, contextual influences should be taken into consideration when policymakers and hospital management tailor policies and interventions to enhance team functioning and, subsequently, the quality of care. This situation is especially relevant for hospitals in rural areas of developing countries, which exhibit unique local contextual characteristics (e.g. shared backgrounds, close interpersonal relationships and resource scarcity) while also being impacted by the larger national context (e.g. national cultural values).

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# APPENDIX 1. SUMMARY OF RESULTS (TEAMWORK COMPONENTS)

| Authors & Year | Aim | Research method | Setting | Teamwork components and the relationship among them | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| Cui et al. (2017) | (1) To test the applicability of the Safety Attitudes Questionnaire (SAQ) in hospitals in Beijing.<br>(2) To investigate the current status of patient safety culture, and to identify the advantages and disadvantages. | Cross-sectional survey: Safety Attitudes Questionnaire (SAQ) | 1663 frontline healthcare professionals in 5 hospitals | Processes: Teamwork climate. | Teamwork climate: positive response rate 59.31%; mean score 74.87.<br>The connection between either inputs or outcomes, and teamwork climate was not tested. | 5 |
| Hu & Broome (2019) | To explore the process of developing an Interprofessional Collaborative (IPC) team, and to determine strategies for IPC. | Semi-structured interview | 2 doctors, 2 nurses, 7 teachers and 4 students from a medical school and a hospital | Processes: Interprofessional collaboration. | The process and strategies to develop an effective IPC team.<br><br>(1) Exploration:<br>Sharing the same goal under the collectivist value; Integrating traditional etiquette and specialty to clarify the roles and contributions;Negotiating the details through emphasising the awareness of challenges.<br>(2) Integration:<br>Continually clarifying roles and contributions to structure the team; Creating credibility for team membership via harmonious thought; Making decisions after regular and open discussion; Developing a platform for the IPC via administrative support.<br>(3) Adjustment:<br>Reflecting on what happened and how effective the IPC is; Adjusting the plan for the next collaboration; Adjustments are best facilitated if recognised and rewarded. | 5 |

| Authors & Year | Aim | Research method | Setting | Teamwork components and the relationship among them | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| Zhong et al. (2019) | To assess the patient safety culture in a hospital and to identify opportunities for improving the hospital's safety culture. | Cross-sectional survey: Hospital Survey on Patient Safety Culture (HSOPSC) | 1562 healthcare professionals in a hospital | Processes: Teamwork within units, teamwork across units and communication openness. | Positive response rate:<br>Teamwork within units: 89.7% for 2018 and 90.3% for 2019;<br>Teamwork across units: 76.2% for 2018 and 77.9% for 2019;<br>Communication openness: 52.2% for 2018 and 55.3% for 2019.<br>Scores (2018):<br>Teamwork within units: 4.3;<br>Teamwork across units: 4.0;<br>Communication openness: 3.5.<br>Compared to the results in the US, "teamwork within units" and "teamwork across units" were scored significantly higher, but "communication openness" was scored significantly lower in this study.<br>The connection between either inputs or outcomes, and the three process composites were not tested. | 5 |
| L. Zhou & Nunes (2012) | To identify barriers to knowledge sharing barriers in the collaboration between traditional Chinese and western medicine staff in Chinese hospitals. | Semi-structured interview | 46 healthcare professionals of the department of neurosurgery in a hospital | Processes: Knowledge sharing barriers in team collaboration process. | Knowledge-sharing barriers in the collaboration between western medicine and traditional Chinese medicine:<br>(1) Philosophical divergence: Different conceptual systems and terminology discrepancy;<br><br>(2) Interprofessional tensions: Philosophical and professional tension;<br>(3) Insufficient interprofessional education and training;<br>(4) Lack of interprofessional common ground. | 5 |

| Authors & Year | Aim | Research method | Setting | Teamwork components and the relationship among them | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| Chu et al. (2014) | To investigate the patient safety culture of health professionals in Jiamusi public hospitals. | Mixed method: Cross-sectional survey (a self-developed questionnaire on patient safety climate) and individual in-depth interviews. | 300 healthcare professionals in 6 hospitals (20 administrators for interviews) | Relationship between inputs and processes:<br>Inputs: Hospital level.<br>Processes: Teamwork across units. | 89.8% of the respondents from secondary hospitals and 92.4% of the respondents from tertiary hospitals rated "teamwork across units" as "good" or "very good". (Descriptive results) | 1 |
| Feng et al. (2012) | To examine nurses' perceptions of patient safety culture, and to explore the factors associated with those perceptions. | Cross-sectional survey: 5 questionnaires including HSOPSC | 248 nurses in a hospital | Relationship between inputs and processes:<br>Inputs: Working years.<br>Processes: Teamwork within units, teamwork across units, and communication openness. | Positive response rate:<br>Teamwork within units: 88.8%;<br>Teamwork across units: 62.2%;<br>Communication openness: 39.1%.<br>Working years in the department was found to influence the total patient safety culture scores, but no specific connection between these inputs and the three composites was described. | 5 |
| Jia et al. (2017) | To understand the situation of nursing teamwork against, and to explore the influencing factors of nursing teamwork so as to find out practical solutions to improve the level of nursing teamwork. | Cross-sectional survey: Nursing Teamwork Survey (NTS) | 358 nurses in a hospital | Relationship between inputs and processes:<br>Inputs: Department and staffing.<br>Processes: Team leadership, shared mental model, trust and backup, and team orientation. | Scores:<br>Team leadership: 4.75;<br>Shared mental model: 4.50;<br>Trust and backup: 4.38;<br>Team orientation: 4.00.<br>Department and staffing were found to influence nurses' teamwork status (nurses from department of gynaecology and obstetrics, surgery, and departments with enough staffing scored significantly higher). | 5 |

| Authors & Year | Aim | Research method | Setting | Teamwork components and the relationship among them | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| K. Jiang et al. (2019) | To investigate patient safety culture in secondary hospitals of Heilongjiang, and to explore the implications of patient safety culture and practices through the perspectives of different healthcare workers. | Cross-sectional survey: Safety Attitudes Questionnaire (SAQ) | 665 healthcare professionals in 9 hospitals | Relationship between inputs and processes:<br>Inputs: Age, marital status, education level, and profession.<br>Processes: Teamwork climate. | Teamwork climate: mean score 74.05.<br>Age, marital status, education level, and profession were found to influence "teamwork climate" (Older staff, married staff, staff with bachelor's degree and doctors scored significantly higher). | 5 |
| C. Liu et al. (2014) | To investigate the patient safety culture in an outpatient setting, and to explore the implications of the safety culture from health workers' and patients' perspective. | Mixed method: Cross-sectional survey (HSOPSC) and in-depth interview | 318 healthcare professionals in 2 outpatient clinics of a hospital (22 patients, 15 healthcare professionals and 12 health managers for interviews) | Relationship between inputs and processes:<br>Inputs: Profession.<br>Processes: Teamwork within units, teamwork across units, and communication openness. | Scores:<br>Teamwork within units: 0.85 in total, 0.85 for physicians, 0.84 for nurses, 0.86 for administrators and 0.83 for other staff;<br>Teamwork across units: 0.56 for physicians, 0.58 for nurses, 0.48 for administrators and 0.68 for other staff (the score in total was not described);<br>Communication openness: 0.31 in total, 0.32 for physicians, 0.30 for nurses, 0.35 for administrators, and 0.29 for other staff.<br>Significant differences were found in "teamwork across units" between other staff and physicians, and between other staff and administrators.<br>The high scores in "teamwork within units" was explained as strong internal protection from the in-depth interviews. | 5 |

| Authors & Year | Aim | Research method | Setting | Teamwork components and the relationship among them | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| Nie et al. (2013) | To measure the patient safety culture in China's hospitals and discuss some of the phenomena unique to China. | Cross-sectional survey: Hospital Survey on Patient Safety Culture (HSOPSC) | 1160 healthcare professionals in 32 hospitals | Relationship between inputs and processes:<br>Inputs: Profession and professional title.<br>Processes: Teamwork within units, teamwork across units, and communication openness. | Positive response rate:<br>Teamwork within units: 84% (US 80%);<br>Teamwork across units: 66% (US 58%);<br>Communication openness: 65% (US 62%).<br>Profession was found to influence "teamwork within units" and "communication openness" (Nurses scored significantly higher than physicians, except for one item in "communication openness").<br>Professional title was found to influence all the three composites (Staff with a lower qualification title scored significantly higher). | 4 |
| C. Song et al. (2014) | To understand the cooperation status of nursing teamwork in two tertiary hospitals in Wuhan. | Cross-sectional survey: Nursing Teamwork Survey (NTS) | 877 nurses in 2 hospitals | Relationship between inputs and processes:<br>Inputs: Age, department, and professional title.<br>Processes: Team leadership, shared mental model, trust, backup, and team orientation. | Scores (Total 4.41)<br>Team leadership: 4.75;<br>Shared mental model: 4.57;<br>Trust: 4.43;<br>Backup: 4.33;<br>Team orientation: 4.25;<br>Age, department and professional title were found to influence nurses' teamwork status (nurses from emergency department, nurses aged 21-30 years old and junior nurses scored significantly higher). | 5 |
| M. Wang & Tao (2017) | To assess the strengths and weaknesses of surgical departments compared with other departments in county hospitals in China with HSOPSC. | Cross-sectional survey: Hospital Survey on Patient Safety Culture (HSOPSC) | 1379 doctors and nurses of surgical and other departments in 19 hospitals | Relationship between inputs and processes:<br>Inputs: Department.<br>Processes: Teamwork within units, teamwork across units, and communication openness. | Positive response rate:<br>Teamwork within units: 80.29% for the hospital, 80.62% for surgical and 79.88% for others;<br>Teamwork across units: 65.34% for the hospital, 65.98% for surgical and 64.50% for others;<br>Communication openness: 55.69% for the hospital, 55.93% for surgical and 55.39% for others.<br>No significance was found between different departments. | 5 |

| Authors & Year | Aim | Research method | Setting | Teamwork components and the relationship among them | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| S. Wang et al. (2016) | To investigate and analyse nurses' perceptions of patient safety culture and its influential factors in 10 hospitals with different levels in a city. | Cross-sectional survey: Hospital Survey on Patient Safety Culture (HSOPSC) | 786 nurses in 10 hospitals | Relationship between inputs and processes:<br>Inputs: Working years, department, and hospital level.<br>Processes: Teamwork within units, teamwork across units, and communication openness. | Positive response rate:<br>Teamwork within units: 96.65%;<br>Teamwork across units: 77.22%;<br>Communication openness: 73.02%.<br>Working years in the hospital, department, and hospital level were found to influence the total patient safety culture scores, but no specific connection between these inputs and the three composites was described. | 5 |
| Y. Xie & X. Xu (2011) | To analyse the effect of individual characteristics of private hospital virtual team members on healthcare team process and provide evidence for private hospital managers to make scientific and reasonable management strategies. | Cross-sectional survey: exploratory survey | Healthcare professionals in 4 private hospitals | Relationship between inputs and processes:<br>Inputs: Gender, age, education level, profession, and professional level.<br>Processes: Team cohesion and mutual trust. | Team cohesion: male scored higher (no significance). Staff between 40 and 50 years old scored significantly higher.<br>Work initiatives: female, staff graduated from junior college, and administrative staff scored higher (no significance).<br>Mutual trust: female, and staff with lower professional titles scored higher (no significance). | 5 |

| Authors & Year | Aim | Research method | Setting | Teamwork components and the relationship among them | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| X. P. Xu et al. (2018) | To evaluate the current patient safety culture in a Chinese hospital with Hong Kong hospital management culture. | Cross-sectional survey: Hospital Survey on Patient Safety Culture (HSOPSC) | 307 healthcare professionals in a hospital | Relationship between inputs and processes:<br>Inputs: Gender, working years, education level, and profession.<br>Processes: Teamwork within units, teamwork across units, and communication openness. | Positive response rate:<br>Teamwork within units: 87.4% for this hospital, 84% for Mainland China and 82% for the US;<br>Teamwork across units: 50% for this hospital, 66% for Mainland China and 61% for the US;<br>Communication openness: 64.2% for this hospital, 65% for Mainland China and 64% for the US.<br>Working years in the department was found to influence "teamwork across units" (Staff with no more than 5 years working years scored significantly higher).<br>Gender, education level, and profession were found to influence "communication openness" (Female, Staff with lower degree, and nurses scored significantly higher). | 5 |
| Hai-ping et al. (2020) | To explore how different cultural values influence teamwork among doctors and nurses in Emergency Departments (EDs) in China. | Semi-structured interview | 10 doctors and 10 nurses of the emergency department in 3 hospitals | Relationship between inputs and processes:<br>Inputs: Culture values (e.g. hierarchy, collectivism, feminine traits and home culture), and staffing.<br>Processes: Leadership, communication, and mutual support. | 4 themes were identified describing how different cultural values were connected with teamwork:<br>(1) Leadership<br>Hierarchy between superiors and subordinates; doctors are superior; northerners are more powerful.<br>(2) Communication<br>Emphasising etiquette; traditionally feminine traits; face-to-face communication.<br>(3) Mutual support<br>Advocating collectivism; being open-minded; tense doctor-patient relationships; clique culture.<br>(4) Staffing<br>High pressure and home culture are related to instability; a shortage of staff. | 5 |

| Authors & Year | Aim | Research method | Setting | Teamwork components and the relationship among them | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| F. Zhang et al. (2018) | To examine first-line nurse managers' perceptions of safety culture, and to explore relationships between their safety attitudes and safety factors. | Cross-sectional survey: Safety Attitudes Questionnaire (SAQ) | 823 first-line nurse managers in 216 hospitals | Relationship between inputs and processes:<br>Inputs: Professional title and hospital level.<br>Processes: Teamwork climate. | Teamwork climate: positive response rate 71.7%; mean score 79.4.<br>Professional title and hospital level were found to influence "teamwork climate" (Senior staff and staff in tertiary hospitals scored significantly higher). | 4 |
| C. Zhao et al. (2019) | (1) To test the reliability and validity of the Safety Attitude Questionnaire (SAQ).<br>(2) To measure the scores of 9 tertiary hospitals.<br>(3) To group the samples by demographic factors with demographic factor levels for each subgroup for comparison between subgroups.<br>(4) To explore the effects of demographic factors on SAQ scores. | Cross-sectional survey: Safety Attitudes Questionnaire (SAQ) | 2190 healthcare professionals in 9 hospitals | Relationship between inputs and processes:<br>Inputs: Gender, age, working years, profession, professional title, and education level.<br>Processes: Teamwork climate. | Teamwork climate: positive response rate 71.0%; mean score 4.20.<br>Gender, age, working years in the hospital, education level, profession, and professional title were found to influence "teamwork climate" (Female staff, younger staff, staff working less than 3 years in the hospital, staff with master's degree, other workers, and sub-senior and junior staff scored significantly higher). | 5 |

| Authors & Year | Aim | Research method | Setting | Teamwork components and the relationship among them | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| X. Zhao et al. (2017) | To investigate patient safety culture and its strengths and weakness through the HSOPSC in a county hospital in Beijing. | Cross-sectional survey: Hospital Survey on Patient Safety Culture (HSOPSC) | 661 healthcare professionals in a hospital | Relationship between inputs and processes:<br>Inputs: Gender, working years, education level, and profession.<br>Processes: Teamwork within units, teamwork across units, and communication openness. | Positive response rate:<br>Teamwork within units: 79.2%;<br>Teamwork across units: 58.2%;<br>Communication openness: 27.4%.<br>Gender, working years in the hospital, education level and profession were found to influence the scores of the three composites (Female scored significantly higher in "teamwork within units", staff with a lower education level and other health workers scored significantly higher in "teamwork across units", and staff with less years in the hospital scored significantly higher in "communication openness"). | 4 |
| W. He et al. (2014) | (1) To clearly describe the composition of surgical team in each case.<br>(2) To determine the correlation between team composition and procedure time. | Observational study | General surgery departments in 2 hospitals | Relationship between inputs and outcomes:<br>Inputs: Team composition (i.e. team size and team membership).<br>Outcomes: Surgical procedure time. | Team composition:<br>The size of a surgical team ranged from 3 to 8, and the average number of members for a surgical procedure was 6.<br>One anaesthesiologist, and at least one surgeon and two nurses participated in each procedure.<br>Adding one member to a stable surgical team would lead to an increase of 34.7 min in procedure time. | 5 |
| J. Liu et al. (2010) | (1) To assess staff job satisfaction of Township Health Centre (THC) in the poor regions.<br>(2) To identify critical determinants to job satisfaction with an attempt to work out strategies to improve the job satisfaction and retention in these institutions. | Cross-sectional survey: a self-developed questionnaire on job satisfaction | 172 healthcare professionals in 17 township health centres (7 in Anhui and 10 in Xinjiang) | Relationship between inputs and outcomes:<br>Inputs: Age, gender, race, processional title, and service time.<br>Outcomes: Job satisfaction. | Teamwork was scored 87.7, ranked the third among all the eight composites regarding job satisfaction (Anhui 81.9, Xinjiang 92.4).<br>Age, gender, race, professional title and service time were found to influence job satisfaction (female, Uyghur, nurses, staff no more than 30 years old and staff working for over 30 years scored significantly higher), but no specific connection between these inputs and teamwork was described. | 4 |

| Authors & Year | Aim | Research method | Setting | Teamwork components and the relationship among them | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| X. Liu et al. (2020) | To test how different types of diversity affect doctor team performance under the influence of a leader's reputation through second-hand data. | Quantitative analysis of secondary data from an online platform | An online consultation platform for doctors | Relationship between inputs and outcomes:<br>Inputs: Team longevity, team size, team average level, leader reputation, online reputation diversity, professional knowledge diversity, status capital diversity, and decision capital diversity.<br>Processes: Team performance. | (1) Team longevity, team size, team average level, leader reputation, online reputation diversity, and professional knowledge diversity were significantly positively correlated with team performance.<br>(2) Status capital diversity and decision capital diversity were negatively correlated with team performance.<br><br>(2) Leader reputation positively moderated the impact of status capital diversity on team performance, and negatively moderated the positive impact of online reputation diversity on team performance. | 5 |
| P. Liu et al. (2018) | (1) To describe the degree of perceived retirement planning among older nurses in the hospital.<br>(2) To examine the relationship between retirement planning and personal and job-related factors.<br>(3) To examine the relationships between job environment, job satisfaction and retirement planning. | Cross-sectional survey: 4 questionnaires related to retirement planning | 152 retiring nurses in 4 hospitals | Relationship between processes and outcomes:<br>Processes: Teamwork.<br>Outcomes: Retirement planning. | 77% of the retiring nurses rated positive for "teamwork", less favourable than all other composites regarding job environment.<br>Teamwork was negatively correlated with nurses' plan making after retirement. | 5 |

| Authors & Year | Aim | Research method | Setting | Teamwork components and the relationship among them | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| W. Song et al. (2019) | To investigate the current status of physician team interaction and to explore potential influencing factors. | Cross-sectional survey: Team Interaction Scale (TIS) | 4016 physicians in 11 hospitals (363 for pilot survey and 3653 for large sampling survey) | Relationship between inputs and processes; Relationship between processes and outcomes. Inputs: Age, gender, discipline, and hospital level. Processes: Team interaction (i.e. communication, coordination, mutual help, team goals, work norms, and cohesion and conflict resolution). Outcomes: Burn-out. | Age, gender, discipline, and hospital level were found to influence Team Interaction Scores (Physicians older than 40 years old, female physicians, physicians of internal medicine, and physicians from ordinary tertiary hospitals scored significantly higher). The overall Team Interaction Scores and its six factors (i.e. communication, coordination, mutual help, team goals, work norms, and cohesion and conflict resolution) were negatively related to burn-out. | 5 |
| S. Hong & Q. Li (2017) | To assess nurses' perceptions towards patient safety culture and adverse events reporting and correlate their perceptions with adverse events reporting rates. | Cross-sectional survey: 2 questionnaires including one derived from SAQ | 989 nurses in 4 hospitals | Relationship between inputs and outcomes; Relationship between processes and outcomes: Inputs: Gender, age, education level, professional title, working unit, work experience. Processes: Teamwork climate. Outcomes: Nurses' adverse events reporting. | Teamwork climate: positive response rate 64.23%; mean score 4.10. Senior nurses and nurses working more than 20 years had significant higher adverse events reporting rates than junior nurses and nurses working less than 20 years, respectively. "Teamwork climate" was found to be a predicting factor for nurses' adverse event reporting. | 5 |

## APPENDIX 2. SUMMARY OF RESULTS (TEAM INTERVENTIONS)

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| Y. Hong et al. (2018) | To investigate the effect of simulation-based training on initial trauma care. | Before-after study | Trauma care training in the trauma centre in a hospital | Training: Simulation-based training (not clarifying the model) in a team consisting of doctors and nurses from emergency department.<br>Phase 1: Introducing new roles and theory.<br>Phase 2: Demonstrating the function of the team.<br>Phase 3: Presenting videos of trauma teams from the US.<br>Phase 4: Simulating different traumatic scenarios, focusing on the role of team leader, assigning roles, coordination of the team, and testing the team. | The team working efficiency (i.e. the times from emergency room arrival to tests and procedures were shorter) were significantly improved after the training. | 5 |
| T. Liu et al. (2019) | To form a standardised procedure by comparing three different de-airing approaches via simulation scenario. | Observational study | Cardiac surgical training in the operating room in a hospital | Training: Simulation-based training on mannequins that simulated the three de-airing approaches (i.e. arterial line filter (ALF) method, arterial-venous loop (A-V Loop) method and isolation of ALF method) by cardiovascular surgical teams, including one cardiopulmonary bypass (CPB) perfusionist, one CPB trainee and other members. | The time to recovery was the lowest for isolation of ALF method (99.4 s), compared to ALF method (290.6 s) and A-F Loop method (196.8 s). Significance was found among the three methods.<br>Perfusionists scored higher (4-5) in non-technical skills (i.e. confidence, communication, teamwork, and improvement) than trainees did (3-4).<br>(Descriptive results) | 5 |

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| Qian et al. (2016) | (1) To investigate the compliance of the adjusted first-hour basic care tasks of septic shock in paediatric intensive care.<br>(2) To evaluate the effect of simulation-based team training on improving the compliance of the tasks. | Observational study | Septic shock care in the paediatric intensive care units in three tertiary teaching hospitals | Training: Simulation-based training on a baby patient simulator that simulated seven adjusted tasks for septic shock care (e.g. oxygen delivering, fluid infusion, laboratory examination and medications). | The complete compliance in the simulation hospital is significantly higher than that in the two non-simulation hospitals (61.7% vs 23.1%).<br>In the seven tasks, three tasks in the three hospitals achieved 100% compliance, while the compliance of the other four tasks in the simulation hospital was significantly higher than that in the two non-simulation hospitals. | 5 |
| Sun et al. (2016) | To explore the effect of the "Team Strategies and Tools to Enhance Performance and Patient Safety" (TeamSTEPPS) course in a hospital. | Before-after study | 100 healthcare professionals in a hospital | Training: Introducing TeamSTEPPS for training health professionals from different departments in a hospital. The TeamSTEPPS programme consists of theoretical lectures, technical practices, summary, and evaluation. | Increase was found in the proportion of nurses that rated their communication skills as "good" or "very good". (Descriptive results) | 3 |
| X. Xie et al. (2011) | To evaluate the effect of simulation-based team training model on advanced cardiac life support (ACLS) for emergency nurses. | Before-after study | 80 Nurses from the hospitals and social medical institutions with different levels in a city | Training: Simulation-based training (not clarifying the model) that simulated advanced cardiovascular life support (ACLS) technique. | Significant improvements were found in nurses' emergency knowledge and skills, and the rate of nurses that were satisfied with the training was 83.3%. | 5 |

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| L. (Lu-Feng) Zhang et al. (2018) | To improve surgeons' performance by simulating the implantation of a continuous-flow left ventricular assist device (CF-LVAD) without cardiopulmonary bypass on an animal model. | Observational study | Cardiac surgical training in the animal experimental centre in a hospital | Training: Simulation-based training on pigs that simulated the implantation of CF-LVAD without cardiopulmonary bypass by cardiovascular surgical teams.<br>The simulation scenarios included three sessions. The surgical technique was more improved in session 3 than that in session 2 and session 1. | The operating time was the least in session 3 (149 min), compared to that in session 2 (189.8 min) and session 1 (262.2 min). Significance was found among the three sessions.<br>The self and senior evaluation scores for surgical techniques were significantly better in session 3 than those in session 2 and session 1. | 4 |
| Wen et al. (2017) | To investigate the effect of implementing the situation-background-assessment-recommendation (SBAR) communication mode in surgical teams in a hospital. | Before-after study | Surgical care in the operating theatre in a hospital | Tools: Constructing preoperative and intraoperative SBAR templates in operating theatre and implementing SBAR report in the surgical processes. | Circulating nurses' satisfaction and patients' satisfaction were significantly improved.<br>The nurses' shifting time and the incidence of shifting issues and adverse events were significantly decreased. | 5 |
| X. Yang et al. (2019) | To assess the effect of implementing standardised communication mode (SBAR) in interventional ward. | Before-after study | Intervention care in the department of interventional vascular surgery in a hospital | Tools: Constructing and implementing SBAR template in the interventional ward. | Patients' satisfaction with health professionals and doctors' satisfaction with nurses were significantly improved, and the incidence of poor communication related adverse events was significantly decreased. | 5 |
| Yuan et al. (2018) | To investigate the efficiency of electronic checklist-based multidisciplinary meeting mode in managing gastrointestinal (GI) malignancies. | Before-after study | Gastrointestinal cancer care in the centre of gastrointestinal surgery in a hospital | Tools: Designing an electronic checklist summarising clinical data of patients to improve the efficiency of discussion and decision-making processes in multidisciplinary meetings. | Significant improvements were found in team working efficiency (i.e. the time costs in each meeting or each case, and the number of cases discussed every month) and hospital stay.<br>The diagnosis accuracy was increased, and the incidence of complications was slightly decreased with no significant difference. | 5 |

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| Y. Chen et al. (2018) | To assess the effect of MDT in managing patients with pancreatic cystic neoplasms (PCNs). | Non-randomised Controlled Trial | The care for pancreatic cystic neoplasms in the department of hepatobiliary and pancreatic surgery in a hospital | (Re)design: Establishing a multidisciplinary team. | The diagnosis accuracy was significantly increased, and the morbidity of complications and the days of hospital stay after surgery were significantly lower in the MDT group. | 5 |
| Du et al. (2011) | To assess the effect of multidisciplinary team (MDT) on managing gastrointestinal malignancy. | Observational study and non-randomised controlled trial | Gastrointestinal cancer care in the department of colorectal surgery in a hospital | (Re)design: Establishing a multidisciplinary team. | The sphincter preservation rate and survival rate were significantly higher, and local recurrence rate was significantly lower in the MDT group. | 3 |
| Z. He et al. (2014) | To investigate the effect of community team management mode on hypertensive care. | Before-after study | Hypertensive care in 6 community health service stations of a community health service centre | (Re)design: Establishing a multidisciplinary team and clarifying team members' roles and responsibilities. Collaboration was advocated in the team. | Overall hypertension-related knowledge awareness, some hypertension-related indicators (e.g. blood pressure, total triglycerides and total cholesterol) and the proportion of patients with normal blood pressure were significantly improved, but no change was found in medication compliance. | 5 |
| W. (Wei) Li et al. (2019) | To summarise the experience and effect of implementing MDT on epilepsy care. | Observational study | Epilepsy care in the epilepsy centre in a hospital | (Re)design: Establishing a multidisciplinary team and clarifying team members' roles and responsibilities. | The effect of multidisciplinary treatment (e.g. diagnosis of patients, the proportion of patients suitable for surgery and the seizure-free rates after surgery) was summarised. | 5 |

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| W. (Weiqin) Li et al. (2009) | To summary the experience of treating severe acute pancreatitis (SAP). | Observational study | The care for severe acute pancreatitis in the research institute of general surgery in a hospital | (Re)design: Establishing a multidisciplinary team and clarifying team members' roles and responsibilities. | The effect of multidisciplinary treatment (e.g. curative rates and mortality rates of both surgical and non-surgical therapy) was summarised. (Descriptive results) | 3 |
| Lin & Pan (2013) | To observe the effect of the team-based community health service model on mobile maternal health care. | Before-after study | Mobile maternal health care in a community health service centre | (Re)design: Establishing a multidisciplinary team and clarifying team members' roles and responsibilities. | The indicators regarding team-based mobile maternal delivery management (e.g. preoperative examination rate, proportion of mobile maternal delivery and systematic management rate) were significantly improved. | 4 |
| Q. (Qiangui) Liu et al. (2009) | To explore the rehabilitation effect of multidisciplinary cooperative rehabilitation treatment mode on pneumoconiosis patients. | Randomised Controlled Trial | The care for pneumoconiosis in the department of respiratory rehabilitation in a hospital | (Re)design: Establishing a multidisciplinary team and clarifying team members' roles and responsibilities. | The symptom of dyspnoea and quality of life were significantly better, but no change was found in the pulmonary function in the intervention group. | 4 |
| Lu et al. (2020) | To examine the effect of well-organised MDT meetings on breast cancer care, compared to disorganised and non-organised MDT meetings. | Observational study | Breast cancer care in a cancer hospital | (Re)design: Optimising the working procedure of a multidisciplinary team by re-organising MDT meetings (e.g. organised by a secretary, using a new meeting room and equipment, adding a pathologist and limiting the number of patients discussed in the meeting). | Significant improvements were found in patients' survival rate and survival time after implementing well-organised MDT meeting. Well-organised MDT treatment was found to be a protective factor for patients' survival. | 5 |

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| Luo et al. (2019) | To assess the effect of MDT based on 5E's renal rehabilitation on the care for peritoneal dialysis (PD) patients. | Randomised Controlled Trial | Peritoneal dialysis care in the peritoneal dialysis centre of Nephrology department in a hospital | (Re)design: Establishing a nursing-led multidisciplinary team and clarifying team members' roles and responsibilities. | The peritoneal dialysis patients' self-management ability (i.e. solution bag replacement, troubleshooting during operation, diet management, complication monitoring, and emotion management and return to social life) was significantly better, and the incidence of peritonitis was significantly lower in the intervention group. | 5 |
| Rui et al. (2019) | To evaluate the effect of multidisciplinary team (MDT) treatment in managing geriatric hip fractures. | Before-after study | Geriatric hip fracture care in a hospital | (Re)design: Standardising the working procedure of a multidisciplinary team by formulating a new procedure (e.g. primary assessment by orthopaedics and emergency surgeons, sharing patients' information in the WeChat group, making individual treatment plan via multidisciplinary collaboration and timely dealing with complications and other concomitant diseases). | The preoperative waiting time, operating time and hospitalisation time were significantly decreased, but the hospitalisation costs were significantly increased. No change was found in mortality rate. | 5 |
| J. Wang & Guo (2018) | To explore the effect of team-based nursing on the hospital-community rehabilitation and negative emotions of patients after renal cancer surgery. | Randomised Controlled Trial | Postoperative care for renal cancer in a hospital | (Re)design: Establishing a multidisciplinary team and clarifying team members' roles and responsibilities. | The perceived scores of pains, anxiety and depression and the incidence of complications were significantly lower, and the quality of life was significantly higher in the intervention group. | 4 |
| D. Wu & Y. Chen (2016) | To explore the impact of establishing a stroke centre treatment team on improving the treatment performance of stroke patients. | Before-after study | Stroke care in the stroke centre in a hospital | (Re)design: Establishing a multidisciplinary team. | The management of the prevention of deep venous thrombosis, anti-thrombotic therapy and the screening of dysphagia were improved, and the outpatient volume and inpatient admission rate were increased. (Descriptive results) | 3 |

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| X. Wu et al. (2019) | To assess the effect of the multidisciplinary co-management on the care for patients with hip fracture. | Before-after study | Hip fracture care in an orthopaedic hospital | (Re)design: Standardising the working procedure of a multidisciplinary team through a pathway of care (i.e. standardising emergency and preoperative assessments and treatments, admission to an orthogeriatric ward, early surgery and early discharge). | Significant improvements were found in the proportion of early surgery after admission and the possibility of receiving specialised assessment, and the incidence of complications was significantly decreased. | 5 |
| Xiao et al. (2015) | To investigate the effect of team performance appraisal programme in community health service centre. | Randomised Controlled Trial | General practitioner service teams in a community health centre | (Re)design: Optimising the working procedure of a novel team performance appraisal programme (e.g. strengthening cooperation inside the team, assigning tasks rationally, reducing work repetition and encouraging improving the efficiency). | Nurses' per capita performance and healthcare professionals' satisfaction were significantly higher. No significance was found in working quality and doctors' per capita performance, but the overall patients' satisfaction was significantly lower. | 5 |
| Xue et al. (2019) | To assess the effect and the health economic benefits of multidisciplinary team enhanced recovery after surgery (MDT-ERAS) on caesarean section care. | Randomised Controlled Trial | Caesarean section care in a hospital | (Re)design: Standardising the working procedure of a multidisciplinary team by formulating a new procedure (e.g. clarifying the preoperative, intraoperative, postoperative and post-discharged procedures). | The puerperal rehabilitation indicators (e.g. time of recovering anus exhausting and eating), overall maternal and infant outcomes (e.g. postpartum haemorrhage and adding milk for neonates), and health economic indicators (e.g. hospitalisation time and costs) were significantly better in the intervention group. | 5 |
| Ye et al. (2012) | To evaluate the effect on managing colorectal cancer after introducing an MDT. | Before-after study | Colorectal cancer care in the gastroenterological department in a hospital | (Re)design: Establishing a multidisciplinary team for cancer care. | The tumour recurrence rate and metastases rate were significantly lower, but the survival rate was significantly higher. The use of MDT management was proven to be an influential factor of patients' overall survival. | 5 |

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| L. (Le) Zhang et al. (2019) | To evaluate the effect of pharmacist-led multidisciplinary care for Chinese systemic lupus erythematosus (SLE) patients. | Randomised Controlled Trial | The care for systemic lupus erythematosus in the rheumatology centre in a hospital | (Re)design: Establishing a multidisciplinary team (MDT) for the care of SLE and enhancing the pharmacist's role in the team (e.g. the pharmacist interviewing patients, giving suggestion on medications and following up patients). | Patients' satisfaction, health status, and disease activity were significantly better in the intervention group, but no change was found in terms of organ damage, self-reported adherence, and beliefs about medicine. | 5 |
| S. Zhang et al. (2019) | To assess the effect of the dedicated multidisciplinary team on thoracic trauma care. | Before-after study | Thoracic trauma care in the department of thoracic surgery in a hospital | (Re)design: Establishing a dedicated thoracic trauma multidisciplinary team. | Significantly more patients were found to require ventilator support. ICU usage rate and mortality rate were slightly decreased with no significant differences, and no changes were found in ICU length of stay and ventilator support duration.<br>The mechanical ventilator usage was found to be associated with the dedicated thoracic trauma team. | 3 |
| M. Zhao et al. (2014) | To explore the effect of hospital information system based multidisciplinary team management on the care for patients with severe craniofacial wounds. | Observational study | The care for severe craniofacial wounds in a hospital | (Re)design: Optimising the working procedure of a multidisciplinary team based on the hospital information system. | The clinical data after implementing the new MDT mode (e.g. number of patients per surgical approach, the cause of death and information regarding recovery) was summarised. | 3 |
| Zhu et al. (2018) | To assess the effect of team cooperation combined with risk prevention intervention on nosocomial infection in emergency children. | Randomised Controlled Trial | The care for children's nosocomial infection in the emergency department in a hospital | (Re)design: Establishing a non-multidisciplinary team and clarifying team members' roles and responsibilities. Collaboration was advocated in the team. | Nursing quality and patients' satisfaction were significantly higher, and the number of risk events and the incidence of infectious disease were significantly lower in the intervention group. | 4 |

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| H. Chen et al. (2011) | To assess the effect of team management mode on the diabetic care. | Randomised Controlled Trial | Diabetic care in a hospital | Programme: Training and (re)design. Technical training, establishing a multidisciplinary team and clarifying team members' roles and responsibilities. | The levels of blood glucose and glycated haemoglobin were significantly lower in the intervention group. | 4 |
| Q. Chen et al. (2019) | To explore the effects of multidisciplinary nursing team on the care for acute multiple traumas. | Before-after study | Acute multiple trauma care in a hospital | Programme: Training and (re)design. Technical training, establishing a multidisciplinary nursing team and clarifying team members' roles and responsibilities. | The working efficiency (i.e. doctors' arrival time and examination time) was significantly improved, the rescue success rate was significantly increased, and the incidence of complications and hospitalisation time were significantly decreased. | 5 |
| Di et al. (2017) | To assess the effect of MDT on early gastric cancer detection. | Before-after study | Gastric cancer detection in the digestive endoscopic centre in a hospital | Programme: Training and (re)design. Technical training, establishing a multidisciplinary team, introducing regular meetings and strengthening the cooperation with members from other departments. | The detection rate of early gastric cancer was significantly increased after cooperation with pathology and gastrointestinal surgery and making intensive gastroscopy for high-risk patients. | 5 |
| Y. Jiang et al. (2015) | To investigate the effect of multidisciplinary team model on the care for spontaneous intracerebral haemorrhage (SICH). | Before-after study | The care for Spontaneous intracerebral haemorrhage in the neurosurgery ward in a hospital | Programme: Tools and (re)design. Multidisciplinary rounds, establishing a multidisciplinary team and standardising the procedures of the team. | The hospitalisation time, readmission rate and the incidence of complications were significantly decreased, but no change was found in hospitalisation costs. | 5 |
| Kong et al. (2016) | To analyse the effect of team management mode on emergency nursing management. | Before-after study | Emergency care in a hospital | Programme: Training and (re)design. Technical training, introducing regular meetings, clarifying team members' roles and responsibilities and optimising the procedures of the team. | The nursing quality score and patients' satisfaction were significantly improved, and nursing error score were significantly decreased. | 5 |

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| Q. (Qin) Liu & Wan (2015) | To evaluate the effect of quality control circle (QCC) on cataract surgery management. | Before-after study | Surgical care in the ophthalmology department in a hospital | Programme: Training and (re)design. Technical training and standardising the procedures of the team. | The working efficiency, error rate and patients' satisfaction were significantly improved. Increased scores were found in communication and coordination skills, team cohesion and sense of responsibility. | 5 |
| Shang (2019) | To explore the effect of diabetic specialised nursing team on diabetic management. | Before-after study | Diabetic care in the endocrinology department in a hospital | Programme: Training and (re)design. Technical training, establishing a new nursing team and standardising the procedures of the team. | The patients' satisfaction with nursing was significantly improved. | 3 |
| C. Wang et al. (2019) | To investigate the effect of multidisciplinary doctor-nurse collaboration team on the perioperative management of geriatric patients with hip fracture. | Observational study | Geriatric hip fracture care in the traumatic emergency centre in a hospital | Programme: Tools and (re)design. Multidisciplinary rounds, establishing a multidisciplinary team and clarifying team members' roles and responsibilities. | The preoperative waiting time, hospitalisation time, and incidence of complications were significantly lower. | 5 |
| L. Wu (2015) | To explore the effects of cancer pain nursing team on cancer pain care for elder patients. | Randomised Controlled Trial | Cancer pain care in a hospital | Programme: Training, tools and (re)design. Technical training, rounds, establishing a new nursing team, clarifying team members' roles and standardising the procedures. | The scores of pain intensity and pain effects were significantly lower, but the quality of life was significantly higher in the intervention group. | 4 |
| Xing et al. (2013) | To explore the effect of intravenous infusion operation and management on infusion care in large-scale comprehensive hospitals. | Before-after study | Intravenous infusion care in a hospital | Programme: Training and (re)design. Technical training, establishing a new team and standardising the procedures of infusion management for each department. | The success rate of peripherally inserted central catheter was increased and the catheter ectopic rate and the rate of infection were decreased. (Descriptive results) | 3 |

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| Xiong et al. (2015) | To assess the effect of blood glucose team management on the care for patients with pathoglycemia in non-endocrinology departments. | Before-after study | Blood glucose management in a hospital | Programme: Training and (re)design. Technical training, establishing a new nursing team, and standardising the procedures of each team in the non-endocrinology departments. | The acceptance rate of blood glucose related knowledge and the compliance rate of blood glucose level were significantly improved. | 5 |
| H. Xu et al. (2017) | To observe the effect of night and holiday emergency teams on safety of care in a specialised hospital. | Before-after study | Emergency care in an ophthalmology hospital | Programme: Training and (re)design. Technical training, establishing a new team, and standardising the procedures of the team (e.g. establishing reporting procedure and evaluation standard and establishing rescue channel). | The working efficiency (i.e. response time, arrival time and treatment time) was improved. | 2 |
| W. Xu et al. (2019) | To assess the effect of implementing a quality improvement project to minimise adverse respiratory events in postanaesthesia care unit. | Before-after study | Postanaesthesia care in the department of anaesthesiology in a hospital | Programme: Training, tools and (re)design. Simulation-based training, checklists, and standardising the procedures of post-anaesthesia care. | The percentage of respiratory adverse events was significantly decreased, but no change was found in postanaesthesia care unit time. | 5 |
| J. Yang & J. Zhang (2016) | To assess the effect of the implementing a postoperative handover protocol in neurosurgical intensive care unit. | Before-after study | Postoperative care in a neurosurgical intensive care unit in a hospital | Programme: Training, tools and (re)design. Team training, checklists, debriefing, and standardising the procedure of handover in the team based on a pathway. | Teamwork scores (i.e. leadership, communication, cooperation, coordination and situation awareness), surgeons' attendance rate, the reporting rate of medical information, and the average rate of pre-NICU admission preparation were significantly increased, and the mechanical ventilation duration was significantly decreased. | 5 |

| Authors & Year | Aim | Research method | Setting | Interventions | Findings | Quality of research design |
|---|---|---|---|---|---|---|
| Yue et al. (2019) | To explore the role of integrated psychological intervention team in the treatment of earthquake victims in comprehensive hospitals. | Before-after study | Psychological care for the earthquake victims in a hospital | Programme: Tools and (re)design. Multidisciplinary rounds, establishing a multidisciplinary team and clarifying team members' responsibilities. | The depression scores (i.e. scores of HAMA, HAMD and IES-R questionnaires) were significantly decreased (i.e. improvement in mental health). | 5 |
| X. Zhou et al. (2019) | To demonstrate the pharmacist's role in an MDT for patients receiving nutrition support therapy (NST). | Observational study | Nutrition support care in the intensive care unit in a hospital | Programme: Tools and (re)design. Multidisciplinary rounds, establishing a multidisciplinary team and emphasising the role of a pharmacist in the team. | Oral communication was found to be the most common communication method for pharmacy recommendation. The effect of pharmacy interventions in the team (e.g. the overall acceptance rate of pharmaceutical interventions and intervention categorisation) was summarised. | 5 |

## APPENDIX 3. INTERVIEW GUIDE

### *Start*

*Our study aims to understand the team functioning and team interventions in county-level hospitals in less affluent areas of China. The teams we are interested in are healthcare teams directly providing care for patients. The administrative teams, logistic teams and IT teams are not included. We want to understand the challenges teams in these hospitals face and the problems they encounter, and how hospital management facilitates these teams to improve performance.*

*I have a lot of questions, but we only have a limited amount of time. I hope you understand that I therefore may need to interrupt you during the interview, to ask additional questions or to steer us to another topic. I hope this is fine by you.*

(1) What different types of health care teams are there in your hospital? (**General information**)

- What makes these teams different?
- Do you also have multidisciplinary teams?
- What are the disciplines included in these MDTs?

*You probably have healthcare teams in your hospital that perform very well, and teams that are (were) not working that well, now or in the past.*

(2) Could you give a very specific example of one team that is working well?

- Why? what makes them so good?
- Is the context in which this team works different from other teams?
- Is the composition of this team different from other teams?
- Is or was management involvement in this team different?
- Do they have specific facilities that help them?

(3) Could you give an example of a team that doesn't (or didn't) work that well?

- Why do you think this team is struggling?
- Is the context in which this team works different from other teams?
- Is the composition of this team different?
- Is or was management involvement in this team different?
- Do they have specific facilities that help them?
- Are they working on improvement or supported to improve?

(4) Are there specific challenges or difficulties for team functioning in county-level hospitals in less affluent areas that other hospitals face less or do not face? (**Social and organizational context**)

-How do you cope with these challenges?

(If not mentioned, ask the specific social and organizational context)

*Literature and reports tell us that the financial support of county-level hospitals is less than larger hospitals and that some even experience insufficient funds. This may also have an influence on team functioning. (**Insufficient fund**)*

(5) Do you also perceive this challenge?

- (If so) How do you cope with this challenge?
- (If not) Why do you think so?

*The national health reforms include many policies that have an effect on hospitals. For example, the health insurance policy and the medical treatment alliance. These policies may influence physicians' behaviors and also have an impact on healthcare teams. (**Policy influence**)*

(6) Do you see any influence of such policies on teams?

- How does it affect teams in your hospital?

*Every team may face challenge and situations that are more difficult than others. For example, emergency events, very complex surgeries, or very difficult, complex patients.*

(7) How do you support teams in your organization to deal with these challenges? (Take the teams you mentioned in the previous questions as examples.)

(8) Have you ever organized training programs to simulate such situations? (**Training**)

- When, for whom, what are the effects?

(9) Have you ever used tools that help support or improve communication between team members? (**Tools**)

- When, for whom, what are the effects?

*Examples from literature are structured communication models (description of SBAR, the information, when, by whom, how), structured debriefing and briefing template, and structured checklists to improve the communication or using IT, cards, and some other assistant tools to facilitate and trigger the communication within the team.*

- Do you use such tools in your hospital?
- When, for whom, what are the effects?

(10) Have you introduced new structures or even new teams to cope with complex team challenges? (**(Re)design**)

- When, where, what are the effects?

(11) Have you also optimized the procedures or workflows to facilitate the work within the team? (**(Re)design**)

- When, for whom, what are the effects?

*Literature describes different aspects of teamwork some of which we have already discussed. For example, team composition which is the configuration of a team and the overall mix of characteristics among people. It can be everything regarding an individual team member, such as age, gender, professional titles, professional background, educational background and personality traits. Literature tells us that the interaction between different composition attributes can influence team effectiveness. It would be good that a team consists of staff that complement each other in the above-mentioned individual features. However, it is hard to be ideal in the real life. (**Team composition**)*

(12) What are the challenges you face in your hospital with team composition?

- How do you cope with these challenges?
- (If no) Why do you think so?

*Literature shows that county-level hospitals in less affluent areas have more difficulty to attract and retain well-educated staff than national and provincial hospitals. (**Lack of well-educated staff**)*

(13) Do you also face this challenge?

- (If so) How do you cope with this challenge?
- (If not) Why do you think so?

*We know from literature that the stability of team composition has impact on team functioning. A stable team makes team members cooperate with each other more fluently. However, if a team is too stable, there will be less innovative thinking in the team, further influencing the development of the team. (**Team stability**)*

(14) Do you also perceive such challenges in your hospital?
- How do you cope with these challenges?
- Are there any teams not that stable?
- What are the challenges of these unstable teams?
- How do you cope with these challenges?

*We know from literature that Chinese hospitals are often very hierarchical, and that people lower in hierarchy often experience difficulty to speak up, therefore inhibiting teamwork. (**Speaking up**)*

(15) Do you recognize this for your hospital?
- (If so) How do you cope with it?
- (If not) Why do you think so?

*We know from literature that cooperation within a team is not that easy. Two people may work well individually, but it does not mean that they also work very well when working together. The reasons are various, for example, different people have different ideas, expertise, and personality traits, one doesn't like another, or there are some objective limited factors. These reasons make cooperation within a team more difficult. (**Team processes**)*

(16) Do you recognize this for your hospital?
- In what type of teams do you experience the most challenges in team cooperation and why?
- How do you cope with these challenges?

*We especially know that multidisciplinary teams may have trouble with teamwork because of the different knowledge, skills, and viewpoints of different disciplines but also because they may not agree on who does what. (**Multidisciplinary team**)*

(17) Is this something you recognize in your hospital? Could you give concrete examples?
- How do you deal with these challenges?

*Now, Let's talk about team leaders. We find from literature that different leaders have different ways of managing a team. For example, some leaders ask team members to do as he/she says, while some other leaders listen to everyone's opinion and encourage team members to express their views. There are advantages and disadvantages of each leadership style, so it is not easy to judge which style is better. (**Leadership**)*

(18) Could you give a concrete example to describe the leadership style of the teams you mentioned previously? The well working team and the team not working that well.

- What are the roles of leaders in these two teams?
- For the well working team, did the leader perceive any challenges for managing the team?
- How did him/her deal with these challenges?
- For the team not working that well, what are the challenges for the leader in managing the team?
- How did him/her deal with these challenges?

### *The end*

*Before ending the interview, we will repeat the research aim and keep in touch with the respondent in case we need more information.*

(19) Do you want to add anything that is relevant to today's topic, but we have not talked about yet? You are very welcome to contact me if you want to add something after the interview.

(20) Do you have any questions? Could I contact you if I have missed something?

### *Greeting*

Thank you again for participating in this interview. We appreciate your contribution to our research.

## APPENDIX 4. MEASURES FOR THE VARIABLES

***Perceived similarity*** (Liden et al., 1993; Williams et al., 2007)

1. Team members handle problems in a similar way.
2. Team members think alike in terms of coming up with a similar solution.
3. Team members analyse problems in a similar way.
4. Team members see things in much the same way.
5. Team members are similar in terms of outlook and values.
6. Team members are alike in a number of areas.

***Leader-member perceived similarity*** (Liden et al., 1993)

1. My team leader and I handle problems in a similar way.
2. My team leader and I think alike in terms of coming up with a similar solution for a problem.
3. My team leader and I analyse problems in a similar way.
4. My team leader and I see things in much the same way.
5. My team leader and I are similar in terms of outlook, perspective, and values.
6. My team leader and I are alike in a number of areas.

***Power distance orientation*** (Dorfman & Howell, 1988; adapted by Culpepper & Watts, 1999 and Lin et al., 2013)

1. The team leader should make most decisions without consulting team members.
2. It is frequently necessary for a team leader to use authority and power when dealing with team members.
3. The team leader should seldom ask for the opinions of team members.
4. The team leader should avoid off-the-job social contacts with team members.
5. Team members should not disagree with management decisions.
6. The team leader should not delegate important tasks to team members.

***Speaking up*** (Morrison et al., 2011; van Dyne & LePine, 1998)

1. I develop and make recommendations concerning issues that affect this team.
2. I speak up and encourage others in this team to get involved in issues that affect this team.
3. I communicate my opinions about work issues to others in this team even if my opinion is different and

4. I keep well informed about issues where my opinion might be useful to this team.
5. I get involved in issues that affect the quality of work life here in this team.
6. I speak up in this team with ideas for new projects or changes in procedures.

***Silence*** (Detert & Edmonson, 2011; Guenter et al., 2017; Mignonac et al., 2018)

1. I withhold ideas from the team leader for changing inefficient work policies.
2. I keep ideas for developing new products or services to myself.
3. I do not speak up about difficulties caused by the way the team leader and the team members interact.
4. I keep quiet in team meetings about problems with daily routines that hamper performance.
5. I withhold thoughts about improving patients' experiences with us.

***Knowledge sharing*** (Bartol et al., 2009; Pittino et al., 2018)

1. Team members share information that can be helpful to the team.
2. Team members keep information flow high to increase team effectiveness.
3. Team members seek helpful information to be shared within the team.
4. Team members share expertise to help resolve the team's problems.
5. Team members collectively offer innovative ideas that can benefit the team.

***Coordination*** (Lechler, 2001; adapted by Song et al., 2019)

1. The team members adjust closely the processing of their tasks.
2. The team members share opinions and information spontaneously.
3. Within the team, team related tasks are well coordinated.

***Perceived quality of care*** (Schmalenberg & Kramer, 2008; Stalpers et al., 2017)

1. On a scale from 1 to 10, how do you rate the quality of patient care in your team?

***Job satisfaction*** (Schmalenberg & Kramer, 2008; Stalpers et al., 2017)

1. On a scale from 1 to 10, how satisfied are you with your current job in your team?

# APPENDIX 5. ADDITIONAL MULTILEVEL MEDIATION ANALYSIS (DIVERSITY IN THE COMPOSITION OF LOCAL AND NON-LOCAL HEALTHCARE PROFESSIONALS)

| | Perceived similarity | Speak up | Silence | Knowledge sharing |
|---|---|---|---|---|
| ***Fixed effects*** | | | | |
| **Within-group (Level 1)** | | | | |
| Intercept | 5.54** | 1.76** | 1.62** | 2.39** |
| **Perceived similarity** | - | 0.56** | 0.39** | 0.54** |
| Gender | 0.23 | 0.04 | -0.31 | 0.30** |
| Team tenure | -0.00 | 0.00 | 0.01 | -0.01 |
| **Between-group (Level 2)** | | | | |
| **Diversity in composition** | -0.22 | 0.08 | 0.50 | 0.16 |
| **Perceived similarity** | - | 0.70** | 0.40** | 0.60** |
| Gender | 0.25 | -0.14 | 0.15 | 0.16 |
| Team tenure | 0.01 | 0.01 | 0.03 | 0.00 |
| Team size | -0.00 | -0.00 | -0.00 | -0.00 |
| **Indirect effect (Mediation)** | - | -0.16 | -0.09 | -0.14 |
| ***Random effects (Variance)*** | | | | |
| Intercept | 0.19** | 0.03 | 0.40** | 0.04 |
| Slope | - | 0.12** | 0.04 | 0.11** |

**: p<0.05; **: p<0.01*

## SUMMARY

The World Health Organization has been promoting the quality of care in developing countries to achieve universal health coverage. In line with this action, the Chinese government has launched health reforms, which include enhancement of team functioning in rural hospitals, especially county-level hospitals. This policy orientation necessitates evidence-based insights into team functioning in these hospitals. Current evidence on team functioning in hospitals is mainly from Western countries and may lack validity in rural areas of developing countries such as rural China because of contextual differences. Therefore, this PhD thesis focuses on team functioning in rural Chinese hospitals and answers the following five research questions.

**Research question 1: What do we know about teamwork in Chinese hospitals? (Chapter 2)**

Before exploring how healthcare teams function in rural Chinese hospitals, we conducted a systematic review to comprehend the team functioning in all Chinese hospitals. **Chapter 2** reports the results of this systematic review, including 70 articles, in two categories: teamwork components and team interventions. The category of teamwork components summarises evidence on team processes and the relationships among team input factors, processes and outcomes; however, most evidence is inconclusive. The team interventions researched in Chinese hospitals mainly focus on the (re)designing of team input factors, unlike the emphasis on optimising team processes in Western hospitals. In addition, we find that the evidence from rural Chinese hospitals is scarce, backing our decision to conduct research in rural Chinese hospitals. To deepen the understanding of team functioning in rural Chinese hospitals, the next research question explores the factors influencing team functioning and interventions to improve team functioning in these hospitals, specifically in county-level hospitals in less affluent areas of China.

**Research question 2: Which factors influence team functioning, and which interventions are implemented to improve team functioning in county-level hospitals in less affluent areas of China? (Chapter 3)**

**Chapter 3** presents findings of the factors influencing and the interventions for improving team functioning in county-level hospitals in less affluent areas of China with semi-structured interview data. The five main factors are “stuck in the middle”, local county setting, difficulty in attracting and retaining talent, strong focus on task design and strong focus on leadership. County-level hospitals face many challenges, such as resource scarcity and relatively low reputation, but are still required to provide extensive

care for local residents, which may cause these hospitals to get "stuck in the middle", which subsequently influences team functioning.

To relieve human resource scarcity and improve teamwork, county-level hospitals have stepped up their recruitment efforts. This helps strengthen team knowledge and skills while the resulting additional intergenerational differences may have various impacts on team functioning. Furthermore, strengthening the workforce by attracting non-locals sometimes causes integration difficulties in these rural hospitals in which communication often benefits from shared local employee backgrounds. These unique challenges and local characteristics may prevent talented (young) professionals from continuing to work in these hospitals, thus further exacerbating the healthcare workforce shortages and posing challenges for team functioning.

Like other Chinese hospitals, county-level hospitals prefer to improve team functioning by (re)design team input factors, such as changing the leader, changing members' roles and inviting external experts. However, with the introduction of multidisciplinary teams, these hospitals have started to implement interventions to improve team processes, such as simulation training and continuous process improvement. In addition to these findings, Chapter 3 also elicits several interesting relationships, which we investigated in other chapters.

**Research question 3: How do generational diversity and perceived similarity influence speaking up, silence and knowledge sharing in rural Chinese hospitals? (Chapter 4)**

Chapter 3 shows that shared backgrounds between local healthcare professionals drive them to perceive each other as similar, which facilitates the interaction between them. However, workforce strengthening by recruiting young healthcare professionals introduces generational diversity, which may produce intergenerational differences that subsequently influence perceived similarity and interaction within teams. To test the relationship between generational diversity and perceived similarity and their impacts on teamwork behaviours (i.e. speaking up, silence and knowledge sharing), we conducted a cross-sectional survey in **Chapter 4** to answer the third research question. The findings show that generational diversity does not significantly influence perceived similarity and the three teamwork behaviours.

When team members perceive themselves to be more similar to other team members, they are not only more likely to express their ideas and share their knowledge but also more prone to keep silent. These findings suggest that increasing the similarity between

team members may benefit team functioning. However, extra efforts may be needed to attenuate the negative impact of (possibly) decreased similarity resulting from workforce strengthening by recruiting a wider diversity of healthcare professionals.

**Research question 4: How do leader-member perceived similarity and power distance orientation influence perceived quality of care and job satisfaction via speaking up and silence in rural Chinese hospitals? (Chapter 5)**

Chapter 3 reveals the pivotal role of leaders in team functioning. The shared backgrounds between local members and leaders may cause these members to perceive their leaders as similar to themselves and, therefore, to be more likely to interact with these similar leaders. However, the high power distance in China's culture may diminish the interaction between members and leaders. To provide more insights, we conducted a cross-sectional survey in **Chapter 5** to investigate how leader-member perceived similarity and power distance orientation influence team functioning in rural Chinese hospitals. The results illustrate that when team members perceive their leaders as more similar to themselves and are more accepting of unequally distributed power, they are more likely to not only express their ideas but also to keep silent. Moreover, their speaking up behaviour is positively associated with perceived quality of care, while silence is not. Therefore, speaking up, rather than silence, transmits the impacts of leader-member perceived similarity and power distance orientation to team outcomes. These findings indicate that speaking up is more important for team functioning in China's rural hospitals than silence. Hospital management may form teams with similar leaders and members or implement extra interventions for the teams in which the similarity between leaders and members is low, to promote speaking up behaviour.

**Research question 5: How do perceived similarity and multidisciplinarity influence coordination and perceived quality of care in rural Chinese hospitals? (Chapter 6)**

Chapter 3 also highlights the role of multidisciplinary teams in providing high-quality care for multimorbid patients in rural Chinese hospitals. However, multidisciplinarity brings advantages and obstacles to team coordination that may impact team performance. To explore the role of multidisciplinarity in team functioning, we conducted a cross-sectional survey in **Chapter 6,** answering the fifth research question. The results show that when team members perceive each other as more similar, they are more likely to perceive a higher level of coordination and, subsequently, better quality of care. However, multidisciplinarity does not moderate the relationship between perceived similarity and coordination. These findings indicate that the functioning of multidisciplinary teams

is not significantly different from the functioning of monodisciplinary teams in China's rural hospitals.

**Chapter 7** summarises the main findings of this thesis and provides in-depth discussions regarding three overarching themes: speaking up and silence, diversity and (dis) similarity within teams and power distance (orientation). In addition, we conclude the methodological strengths and limitations and provide insights for hospital management and policy from two aspects: diversity management and contextual influences.

In a nutshell, this PhD thesis uses different research methods to investigate team functioning in rural Chinese hospitals, especially the relationships among team inputs, processes and outcomes. The findings highlight the crucial role of deep-level perceived similarity in team functioning and may therefore drive hospital management to pay due attention to diversity management. Diversity management can increase healthcare workforce strengthening efforts made by rural Chinese hospitals and progress towards universal health coverage. In addition, hospital management should consider contextual influences when tailoring interventions to improve team functioning and, subsequently, the quality of care. The latter finding also translates to similar contexts in other developing countries.

## SAMENVATTING

De Wereldgezondheidsorganisatie bevordert de kwaliteit van de zorg in ontwikkelingslanden om universele gezondheidszorgdekking te bereiken. In lijn met deze actie heeft de Chinese regering hervormingen op het gebied van de gezondheidszorg gelanceerd, waaronder een verbetering van het functioneren van teams in rurale ziekenhuizen, met name in ziekenhuizen op districtsniveau. Deze beleidsoriëntatie vereist op bewijs gebaseerde inzichten in het functioneren van teams in deze ziekenhuizen. Het huidige bewijsmateriaal over het functioneren van teams in ziekenhuizen is voornamelijk afkomstig uit westerse landen en kan in rurale gebieden van ontwikkelingslanden, zoals het rurale China, onvoldoende valide zijn vanwege contextuele verschillen. Daarom richt dit proefschrift zich op het functioneren van teams in China's rurale ziekenhuizen en beantwoordt het de volgende vijf onderzoeksvragen.

**Onderzoekvraag 1: Welke wetenschappelijke kennis is er over het functioneren van teams in Chinese ziekenhuizen? (Hoofdstuk 2)**

Voordat we onderzochten hoe zorgteams functioneren in China's rurale ziekenhuizen, hebben we een systematische review uitgevoerd om het functioneren van teams in alle Chinese ziekenhuizen te begrijpen. **Hoofdstuk 2** rapporteert de resultaten van deze systematische review, die 70 artikelen omvat, in twee categorieën: componenten van teamfunctioneren en teaminterventies. De categorie componenten van teamfunctioneren vat het bewijs samen over team processen en de relaties tussen teaminputfactoren, -processen en -uitkomsten; het meeste bewijs is echter niet doorslaggevend. De teaminterventies die in Chinese ziekenhuizen worden onderzocht, richten zich vooral op het (her)ontwerpen van teaminputfactoren, in tegenstelling tot de nadruk op het optimaliseren van team processen in westerse ziekenhuizen. Bovendien constateren we dat het bewijsmateriaal uit China's rurale ziekenhuizen schaars is. Dit ondersteunt onze beslissing om onderzoek te doen in China's rurale ziekenhuizen.

Om het begrip van het functioneren van teams in China's rurale ziekenhuizen te verdiepen, onderzoekt de volgende onderzoeksvraag de factoren die het functioneren van teams beïnvloeden en interventies om het functioneren van teams in deze ziekenhuizen te verbeteren, met name in ziekenhuizen op districtsniveau in minder welvarende gebieden van China.

**Onderzoeksvraag 2: Welke factoren beïnvloeden het functioneren van teams, en welke interventies worden geïmplementeerd om het functioneren van teams te verbeteren in ziekenhuizen op districtsniveau in minder welvarende gebieden van China? (Hoofdstuk 3)**

**Hoofdstuk 3** presenteert bevindingen van de factoren die van invloed zijn en de interventies voor het verbeteren van het functioneren van teams in ziekenhuizen op districtsniveau in minder welvarende gebieden van China met semigestructureerde interviewgegevens. De vijf belangrijkste factoren zijn 'in het midden blijven steken', de lokale situatie in het district, de moeilijkheid om talent aan te trekken en te behouden, een sterke focus op het ontwerpen van taken, en een sterke focus op leiderschap. Ziekenhuizen op districtsniveau worden met veel uitdagingen geconfronteerd, zoals schaarste aan middelen en een relatief lage reputatie, maar moeten evengoed uitgebreide zorg bieden aan lokale bewoners. Deze situatie kan ertoe kan leiden dat deze ziekenhuizen 'in het midden blijven steken', hetgeen vervolgens het functioneren van teams beïnvloedt.

Om de schaarste aan personeel te verminderen en het teamwerk te verbeteren, hebben ziekenhuizen op districtsniveau hun wervingsinspanningen opgevoerd. Dit helpt de teamkennis en vaardigheden te versterken, terwijl de daaruit voortvloeiende extra intergenerationele verschillen verschillende gevolgen kunnen hebben voor het functioneren van teams. Bovendien veroorzaakt het versterken van de beroepsbevolking door het aantrekken van niet-lokale werknemers soms integratieproblemen in deze rurale ziekenhuizen, waar de communicatie vaak profiteert van gedeelde lokale werknemersachtergronden. Deze unieke uitdagingen en lokale kenmerken kunnen getalenteerde (jonge) professionals ervan weerhouden om in deze ziekenhuizen te blijven werken, waardoor het tekort aan arbeidskrachten in de gezondheidszorg verder wordt verergerd en uitdagingen voor het functioneren van teams ontstaan.

Net als andere Chinese ziekenhuizen geven ziekenhuizen op districtsniveau de voorkeur aan het verbeteren van het functioneren van teams door teaminputfactoren te (her) ontwerpen, zoals het veranderen van de leider, het veranderen van de rollen van de leden en het uitnodigen van externe experts. Met de introductie van multidisciplinaire teams zijn deze ziekenhuizen echter begonnen met het implementeren van interventies om teamprocessen te verbeteren, zoals simulatietraining en continue procesverbetering. Naast deze bevindingen onthult Hoofdstuk 3 ook een aantal interessante relaties, die we in de volgende hoofstukken hebben onderzocht.

**Onderzoeksvraag 3: Hoe beïnvloeden generatiediversiteit en waargenomen gelijkenis het spreken, zwijgen en het delen van kennis in China's rurale ziekenhuizen? (Hoofdstuk 4)**

Hoofdstuk 3 laat zien dat gedeelde achtergronden tussen lokale gezondheidszorgprofessionals ervoor zorgen dat ze elkaar als gelijken beschouwen, wat de interactie tussen hen vergemakkelijkt. Het versterken van het personeelsbestand door het werven van jonge gezondheidszorgprofessionals introduceert echter generatiediversiteit, wat intergenerationele verschillen kan veroorzaken die vervolgens de waargenomen gelijkenis en interactie binnen teams beïnvloeden. Om de relatie tussen generatiediversiteit en waargenomen gelijkenis en hun impact op teamwerkgedrag (d.w.z. spreken, zwijgen en kennis delen) te testen, hebben we in **Hoofdstuk 4** een cross-sectioneel onderzoek uitgevoerd om de derde onderzoeksvraag te beantwoorden. De bevindingen laten zien dat generatiediversiteit geen significante invloed heeft op de waargenomen gelijkenis en de drie teamwerkgedragingen.

Wanneer teamleden zichzelf meer op andere teamleden vinden lijken, zullen ze niet alleen eerder hun ideeën uiten en hun kennis delen, maar ook meer geneigd zijn om te zwijgen. Deze bevindingen suggereren dat het vergroten van de gelijkenis tussen teamleden het functioneren van teams ten goede kan komen. Er kunnen echter extra inspanningen nodig zijn om de negatieve impact van de (mogelijk) verminderde gelijkenis als gevolg van de versterking van het personeelsbestand te verzachten door een grotere diversiteit aan gezondheidszorgprofessionals aan te werven.

**Onderzoeksvraag 4: Hoe beïnvloeden de waargenomen gelijkenis en machtsafstand oriëntatie van leiders de waargenomen kwaliteit van de zorg en werktevredenheid via hun stem en stilte in China's rurale ziekenhuizen? (Hoofdstuk 5)**

Hoofdstuk 3 onthult de cruciale rol van leiders in het functioneren van teams. De gedeelde achtergronden tussen lokale leden en leiders kunnen ervoor zorgen dat deze leden hun leiders als vergelijkbaar met henzelf beschouwen en daardoor waarschijnlijker met deze soortgelijke leiders in contact komen. De grote machtsafstand in de Chinese cultuur kan echter de interactie tussen leden en leiders verminderen. Om meer inzicht te verschaffen, hebben we in **Hoofdstuk 5** een cross-sectioneel onderzoek uitgevoerd om te onderzoeken hoe de waargenomen gelijkenis en machtsafstand oriëntatie van leiders het functioneren van teams in China's rurale ziekenhuizen beïnvloeden. De resultaten illustreren dat wanneer teamleden hun leiders beschouwen als meer op henzelf lijkend en ongelijk verdeelde macht meer accepteren, het waarschijnlijker is dat ze niet alleen hun ideeën uiten, maar ook zwijgen. Bovendien hangt hun spreekgedrag positief samen

met de waargenomen kwaliteit van zorg, terwijl dat niet geldt voor zwijgen. Daarom brengt spreken, en niet zwijgen, de impact over van de waargenomen gelijkenis en machtsafstand van de leider op de teamresultaten. Deze bevindingen geven aan dat het uitspreken van je mening belangrijker is voor het functioneren van teams in China's rurale ziekenhuizen dan zwijgen. Het ziekenhuismanagement kan teams vormen met vergelijkbare leiders en leden of extra interventies implementeren voor de teams waarin de gelijkenis tussen leiders en leden beperkt is, ter bevordering van spreken.

**Onderzoeksvraag 5: Hoe beïnvloeden waargenomen gelijkenis en multidisciplinariteit de coördinatie en waargenomen kwaliteit van zorg in China's rurale ziekenhuizen? (Hoofdstuk 6)**

Hoofdstuk 3 benadrukt ook de rol van multidisciplinaire teams bij het leveren van hoogwaardige zorg aan multimorbide patiënten in China's rurale ziekenhuizen. Multidisciplinariteit brengt echter zowel voordelen als obstakels met zich mee voor teamcoördinatie die van invloed kunnen zijn op de teamprestaties. Om de rol van multidisciplinariteit in het functioneren van teams te onderzoeken, hebben we in **Hoofdstuk 6** een cross-sectioneel onderzoek uitgevoerd, waarmee we de vijfde onderzoeksvraag beantwoorden. De resultaten laten zien dat naarmate teamleden vinden dat ze meer op elkaar lijken, zij eerder goede coördinatie zullen ervaren en, als gevolg daarvan, een betere kwaliteit van de zorg. Multidisciplinariteit modereert deze relatie tussen waargenomen gelijkenis en coördinatie niet. Deze bevindingen geven aan dat het functioneren van multidisciplinaire teams niet significant verschilt van het functioneren van monodisciplinaire teams in China's rurale ziekenhuizen.

**Hoofdstuk 7** vat de belangrijkste bevindingen van dit proefschrift samen en biedt diepgaande discussies over drie overkoepelende thema's: spreken en zwijgen, diversiteit en (onge)gelijkenis binnen teams en machtsafstand. Daarnaast bespreekt dit hoofdstuk de methodologische sterkten en zwakten en biedt het inzichten voor ziekenhuismanagement en -beleid vanuit twee aspecten: diversiteitsmanagement en contextuele invloeden.

In een notendop gebruikt dit proefschrift verschillende onderzoeksmethoden om het functioneren van teams in China's rurale ziekenhuizen te onderzoeken, met name de relaties tussen teaminputs, processen en resultaten. De bevindingen benadrukken de cruciale rol van waargenomen gelijkenis in het functioneren van teams en kunnen er daarom toe leiden dat ziekenhuismanagement de nodige aandacht gaat besteden aan diversiteitsmanagement. Diversiteitsmanagement kan het personeelsbestand in de gezondheidszorg vergroten, de inspanningen van China's rurale ziekenhuizen versterken

en vooruitgang in de richting van universele gezondheidszorgdekking bevorderen. Bovendien moet het ziekenhuismanagement rekening houden met contextuele invloeden bij het afstemmen van interventies om het functioneren van teams en daarmee de kwaliteit van de zorg te verbeteren. Deze laatste bevinding vertaalt zich ook naar vergelijkbare contexten in andere ontwikkelingslanden.

## ABOUT THE AUTHOR

Hujie Wang was born on 7th November 1986 in Hunan province, China. He was admitted to a bachelor-master joint programme, Clinical Medicine (7-year), at Huazhong University of Science and Technology, China in 2003 and obtained a Master's degree in 2010. After graduation, he began to work in the Refractive Surgery Centre, Department of Ophthalmology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology in 2010. In November 2013, he was promoted to attending physician and lecturer. Since then, he has started doing operations on myopic patients and taking education tasks, such as giving lectures and clinical practice teaching. In addition, he was also involved in some management work, for instance, attending monthly meetings organised by the outpatient department and evaluating healthcare professionals' performance for the Refractive Surgery Centre. This management experience aroused his interest in healthcare management research.

After being an ophthalmologist for nine years, he started his PhD trajectory, team functioning in Chinese hospitals, in the section of Health Services Management and Organisation, Erasmus School of Health Policy and Management, Erasmus University Rotterdam. His research includes qualitative and quantitative studies investigating what influences healthcare team functioning in rural Chinese hospitals. Furthermore, he also played as a reviewer for journals, such as BMC Public Health, BMC Health Services Research, BMC Nursing, BMC Primary Care, Scientific Reports and Frontiers in Health Services. In addition to these research activities, he was involved in the translation tasks of the training and visiting programmes organised by Erasmus School of Health Policy and Management for the Chinese delegations from the Health Human Resources Development Centre of the National Health Commission of China and Shanghai (Shenkang) Hospital Development Centre.

# PHD PORTFOLIO

| | |
|---|---|
| Name | Hujie Wang |
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| PhD period | September 2019 – August 2024 |
| Promotor | Prof.dr. Joris van de Klundert |
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| **Courses** | **ECTS** | **Year** |
|---|---|---|
| Responsible research data management (RDM) | 1.0 | 2019 |
| Searching and managing your literature | 1.0 | 2019 |
| Quantitative data collection with a questionnaire | 1.5 | 2019 |
| Brush up your research design | 2.5 | 2019 |
| Professionalism and integrity in research | 1.0 | 2019 |
| How to finish your PhD in time | 2.5 | 2019 |
| Nature and nurture: homo sapiens in the city | 1.0 | 2020 |
| English academic writing for PhD candidates | 2.0 | 2020 |
| Participatory action research (PAR) | 1.0 | 2020 |
| Qualitative comparative analysis (QCA) | 2.5 | 2020 |
| Doing the literature review | 1.5 | 2020 |
| Self-presentation: focus, structure, interaction and visualisation | 2.5 | 2020 |
| Mixed method research: How to combine diverse qualitative and quantitative methods | 2.5 | 2020 |
| Qualitative coding with ATLAS.Ti | 1.5 | 2020 |
| Qualitative interview techniques | 2.0 | 2020 |
| Visual exploration of scientific literature with VOSviewer | 1.5 | 2020 |
| Shut up and write | 1.0 | 2020 |
| The focus group method | 2.5 | 2021 |
| Q-methodology | 2.5 | 2021 |
| Communicating your research: lessons from Bitescience | 1.5 | 2021 |
| How to get your article published | 2.5 | 2021 |
| Data analysis with R | 2.5 | 2022 |

| Journal review activities | Year |
|---|---|
| Frontiers in Health Services | 2023 |
| BMC Public Health | 2024 |
| BMC Health Services Research | 2024 |
| BMC Nursing | 2024 |
| BMC Primary Care | 2024 |
| Scientific Reports | 2024 |

| Translation activities | Year |
|---|---|
| Hospital management delegation from Health Human Resources Development Centre, National Health Commission, China | 2019 |
| Hospital management delegation from Shanghai (Shenkang) Hospital Development Centre, China | 2023 |

| Publications |
|---|
| **Wang, H.**, van Wijngaarden, J., Buljac-Samardzic, M., & van de Klundert, J. (2023). Factors and interventions determining the functioning of health care teams in county-level hospitals in less affluent areas of China: a qualitative study. *Frontiers in Public Health*, *11*, 1082070. |
| **Wang, H.**, Buljac-Samardzic, M., Wang, W., van Wijngaarden, J., Yuan, S., & van de Klundert, J. (2021). What do we know about teamwork in Chinese hospitals? A systematic review. *Frontiers in Public Health*, *9*, 735754. |
| Wang, W., van Wijngaarden, J., **Wang, H.**, Buljac-Samardzic, M., Yuan, S., & van de Klundert, J. (2021). Factors Influencing the Implementation of Foreign Innovations in Organization and Management of Health Service Delivery in China: A Systematic Review. *Frontiers in Health Services*, *1*, 766677. |

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