TUM School of Social Science and Technology
Technische Universität München

Doctor-patient communication in undergraduate medical education:

Competence and attitudes

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Vollständiger Abdruck der von der TUM School of Social Science and Technology der Technischen Universität München zur Erlangung einer **Doktorin der Philosophie (Dr. phil.)** genehmigten Dissertation.

Vorsitzender:	Prof. Dr. Andreas Obersteiner
Prüfer:innen der Dissertation:	Prof. Dr. Pascal O. Berberat
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Die Dissertation wurde am 12.01.2022 bei der Technischen Universität München eingereicht und von der TUM School of Social Science and Technology am 29.03.2022 angenommen.

For Leonard Tim.

Mut steht am Anfang des Handelns, Glück am Ende.

Demokrit

Danke

An dieser Stelle möchte ich nun einigen Personen, die meinen Weg bis hierhin begleitet haben, DANKE sagen:

Prof. Dr. med. Pascal O. Berberat – als betreuender Professor dieser Arbeit hat er stets einen kritischen Blick gehabt und mit seiner Erfahrung diese Arbeit vorangebracht und bereichert. Vielen herzlichen Dank!

Prof. Dr. Tina Seidel – als Zweitbetreuerin dieser Arbeit möchte ich mich für ihr Feedback und die konstruktive Unterstützung vor allem bei der methodischen Umsetzung und theoretischen Fundierung dieser Arbeit bedanken.

Ein herzlicher Dank gilt *Prof. Dr. Andreas Obersteiner* für die Übernahme des Prüfungsvorsitzes. Er hat somit einen wesentlichen Beitrag dazu geleistet, dass diese Promotion den Rahmenbedingungen entsprechend abgeschlossen werden konnte. Vielen Dank!

PD Dr. Martin Gartmeier – mit seiner Erfahrung auf dem Gebiet der (ärztlichen) Gesprächsführung und seinem Vertrauen in meine Fähigkeiten hat er mich als Mentor all die Jahre begleitet. Vielen Dank für seine Unterstützung!

Meinen lieben Kolleginnen und Kollegen des TUM MEC – ihnen danke ich für die gemeinsamen Kaffeekränzchen, für die Aufreger der Woche, für das Schulterzucken und Kopfschütteln und für die Lachanfälle. Ich freue mich Teil dieses Teams bestehend aus Leuten zu sein, die unglaublich facettenreich und auf ihre Art und Weise einzigartig sind. Besonders möchte ich hier nun aber *das Forschungsteam des TUM MEC* bestehend aus Nana Jedlicska, Dr. Susanne Heininger, Sylvia Pittroff und Laura Janssen hervorheben. Ich möchte mich für ihre offenen Ohren, ihre Ratschläge und Aufmunterungen sowie für ihr Feedback und das Korrekturlesen während der schreibintensiven Phasen bedanken. Thanks for the ride!

Dem Projektteam ÄKHOM bestehend aus Prof. Dr. Sigrid Harendza, Prof. Dr. Martina Kadmon, Sarah Prediger, Dr. Sophie Fürstenberg und Dr. Fabian Fincke – es war mir eine wahre Freude und Ehre mit ihnen dieses Projekt bestritten zu haben. Vielen Dank für diese unvergessliche Erfahrung!

Ein besonderer Dank geht an alle *Medizinstudierenden*, die an den Studien für diese Promotion teilgenommen haben! Ebenfalls möchte ich mich bei Melanie Zimmerhackl, Anna Rothammer und Tina Pfülb für ihre Unterstützung beim Videorating ganz herzlich bedanken!

Meinen Eltern Martina und Werner sowie meinem Bruder Tim – ich möchte ihnen für ihre Unterstützung und Geduld auf meinem bisherigen Weg und ihren unermüdlichen Glauben an meine Fähigkeiten danken!

Meinem Mann Christian – durch seine Unterstützung mit Obstschnitzen, Schokolade und dem Schmeißen des Haushaltes in schreibintensiven Phasen, hat er mir stets den Rücken freigehalten und mich in der größten Verzweiflung wieder aufgebaut. Ich danke ihm sehr!

Abstract

Doctor–patient communication is a pivotal aspect of the medical profession. The acquisition of medical communication competence is already being fostered in undergraduate medical education. Current communication assessment approaches focus on measuring particular communication skills in an analytic attempt by trained raters instead of providing a more holistic view of medical students' communication competence. This dissertation combined analytic and holistic approaches to assess medical communication competence and to reveal insights into the change in medical communication competence during undergraduate medical education. The thesis contributes two different approaches: a performance-based assessment of medical students in the first and final clinical years of undergraduate medical education, applying a multitrait – multimethod approach, and the investigation of attitude profiles toward medical communication. Both approaches contribute to research related to the assessment and change of medical communication competence through two published articles.

The first article reports a study (N = 163) that combined analytic and holistic approaches to assess medical communication competence and compared the performance of two cohorts of medical students. The analytic approach included the adaptation of the Kalamazoo Communication Skills Assessment Form for German-speaking countries and the examination of its psychometric properties regarding reliability and validity. The holistic approach involved the assessment of medical communication competence in a real-life simulation that considered the perspectives of medical students' self-appraisal, standardized patients' views and external perspectives by trained raters. The results provided initial evidence of a psychometrically appropriate measure by applying a multitrait – multimethod approach. The findings seemed to reveal an increase in medical communication competence based on conversational aspects during undergraduate medical education, whereas interpersonal aspects seemed to remain stable over time.

The second study (N = 47) was an investigation the change in medical students' attitude profiles toward medical communication during the clinical elective year by applying the Q methodology. Q analysis revealed three different attitude profiles. The attitude profiles seemed to differ in their importance toward building a trustworthy interpersonal relationship, facilitating shared decision making, and providing structure to the conversation. Overall, attitudes toward a patient-centered communication approach gained importance during the clinical elective year.

In summary, the present dissertation reveals new empirical findings toward the change and holistic assessment of medical communication competence in contributing to performance in simulation-based assessment of medical communication competence and provides an approach to examine underlying attitudes toward medical communication.

Zusammenfassung

Ärztliche Gesprächsführung ist ein zentraler Aspekt des Arztberufes. Der Erwerb von ärztlicher Gesprächskompetenz wird bereits in der medizinischen Ausbildung gefördert. Die derzeitigen Ansätze zur Bewertung der Gesprächskompetenz konzentrieren sich auf die Messung bestimmter kommunikativer Fähigkeiten durch geschulte Beurteiler:innen in einem eher analytischen Ansatz, anstatt einen holistischen Blick auf die Gesprächskompetenz der Medizinstudierenden zu bieten. In dieser Dissertation wurden analytische und holistische Ansätze kombiniert, um die ärztliche Gesprächskompetenz zu bewerten und Erkenntnisse über die Veränderung dieser Kompetenz während des Medizinstudiums zu gewinnen. Die Dissertation verfolgt hierbei zwei unterschiedliche Ansätze: eine performanzbasierte Bewertung von Medizinstudierenden im ersten und letzten klinischen Jahr des Medizinstudiums unter Anwendung eines Multitrait-Multimethod-Ansatzes und die Untersuchung von Einstellungsprofilen zur ärztlichen Gesprächsführung. Beide Ansätze tragen mit zwei veröffentlichten Artikeln zum aktuellen Forschungsstand hinsichtlich der Bewertung und Veränderung ärztlicher Gesprächskompetenz bei.

Der erste Artikel beschreibt eine Studie (N = 163), in der analytische und holistische Ansätze zur Bewertung der ärztlichen Gesprächskompetenz kombiniert und die Performanz von zwei Kohorten Medizinstudierender verglichen wurden. Der analytische Ansatz umfasste die Adaptation des Kalamazoo Communication Skills Assessment Form für den deutschsprachigen Raum und die Untersuchung seiner psychometrischen Eigenschaften hinsichtlich Reliabilität und Validität. Der holistische Ansatz beinhaltete die Bewertung der ärztlichen Gesprächskompetenz in einer realen Simulation durch die Selbsteinschätzung der Medizinstudierenden, der Einschätzung der standardisierten Patient:innen und der Fremdeinschätzung durch geschulte Rater:innen. Die durch einen Multitrait-Multimethod-Ansatz erzielten Ergebnisse lieferten erste Anhaltspunkte für ein psychometrisch geeignetes Messinstrument. Die Ergebnisse deuten auf eine Zunahme konversationeller Aspekte der ärztlichen Gesprächskompetenz hin, während die interpersonellen Aspekte im Laufe der Zeit stabil zu bleiben scheinen.

Die zweite Studie (N = 47) untersuchte die Veränderung der Einstellungsprofile zur ärztlichen Gesprächsführung von Medizinstudierenden während des Praktischen Jahres unter Anwendung der Q-Methode. Die Q-Analyse ergab drei verschiedene Einstellungsprofile. Die Einstellungsprofile schienen sich in ihrer Bedeutung für den Aufbau einer vertrauensvollen zwischenmenschlichen Beziehung, die Förderung der gemeinsamen Entscheidungsfindung und die Strukturierung des Gesprächs zu unterscheiden. Insgesamt deutet es darauf hin, dass ein patientenzentrierter Gesprächsansatz in den Einstellungsprofilen während des Praktischen Jahres an Bedeutung gewinnt.

Zusammenfassend lässt sich sagen, dass die vorliegende Dissertation neue empirische Erkenntnisse über die Veränderung und Bewertung der ärztlichen Gesprächskompetenz im Hinblick auf die Leistung in simulationsbasierten Assessments der ärztlichen Gesprächskompetenz liefert und einen Ansatz zur Untersuchung der zugrunde liegenden Einstellungen zur ärztlichen Gesprächsführung bietet.

Included Publications

The present dissertation embodies two journal articles published in the English language in peer-reviewed and internationally listed journals. The author of the dissertation, as the first author of both journal articles, plays a leading role in the conception of the study, the data collection and analyses, and the preparation for publication (Article A: 70%, Article B: 80%). The supervisor, Prof. Dr. Pascal O. Berberat (Article A: 10%, Article B: 10%), and the coauthor, PD Dr. Martin Gartmeier (Article A: 10%, Article B: 10%), further guided the work on data analyses and the preparation for publication on both journal articles. The two additional coauthors, Prof. Dr. Sigrid Harendza (Article A: 5%) and Prof. Dr. Martina Kadmon (Article A: 5%), supported the conception of the study and the data collection of journal article A.

Journal article A was submitted in the English language to the internationally listed and peer-reviewed Journal *Zeitschrift für pädagogische Psychologie* in May 2018 and was accepted for publication in February 2019 (see Appendix A).

Schick, K., Berberat, P. O., Kadmon, M., Harendza S., & Gartmeier, M. (2019). German language adaption of the Kalamazoo communication skills assessment form (KCSAF): A multi-method study of two cohorts of medical students. *Zeitschrift für pädagogische Psychologie,* 33(2), 135–147. https://doi.org/10.1024/1010-0652/a000241.

Journal article B was submitted in the English language to the internationally listed and peer-reviewed Journal *Frontline Learning Research* in November 2019 and was accepted for publication in December 2020 (see Appendix B).

Schick, K., Gartmeier, M., & Berberat, P. O. (2021). Senior medical student attitudes toward patient communication and their development across the clinical elective year – A Q methodology study. *Frontline Learning Research*, *9*(1), 1–29. https://doi.org/10.14786/flr.v9i1.583.

Contents

1. Introduction

Communication is a very frequent and a very important professional task of physicians: they conduct approximately 150,000 to 200,000 medical interviews during their professional career (Fallowfield et al., 2002). Further, most patient encounters (except emergencies) start with a dialogue between physicians and patients. Despite the frequency of medical interviews, patients often claim the insufficient quality of these dialogues (Levinson et al., 2010). They complain that their physicians do not listen to the patients' concerns, the doctors do not care about the patients' problems, or provide insufficient information about the planned treatment (Levinson et al., 2010). However, high-quality medical interviews have advantages for the patient, for the doctor, and for the public health system. In their review, Levinson et al. (2010) stated that well-conducted medical interviews facilitate patients' satisfaction with their treatments. Patients are more likely to adhere to the therapy and treatment plan, which results in a better healing process. Patients improve their ability to self-manage their chronic disease (Levinson et al., 2010). Moreover, physicians with good communication skills show higher job satisfaction and lower stress and burnout risk (Ha et al., 2010), as the health system is also relieved, as doctors are less absent due to illness and patients change doctors less frequently because the patients trust doctors more (Ha et al., 2010).

Physicians need to be competent communicators to perform successful medical interviews. The concept of competence in medical education and general educational research refers to applying skills, knowledge, and attitudes (competencies) successfully to given situation (Blömeke et al., 2015; Epstein & Hundert, 2002; Frank et al., 2010; Klieme et al., 2008; Koeppen et al., 2008; Shavelson, 2010). The concept of (medical) professional communication competence describes the application of certain communication competencies, such as gathering and providing information, shared decision making, and building trustworthy interpersonal relationships in different situations and to multifaceted patient needs (Schick et al., 2019; Wiesbeck et al., 2017).

Medical communication competence is included in the CanMeds framework as the physicians' role as a "communicator", one of seven roles of the medical profession (Frank et al., 2015). Communication is the relational function of the most commonly cited definition of the medical professional competence, which includes situations in which the physician communicates with patients, students, and colleagues, such as conflict management, teaching, and teamwork (Epstein & Hundert, 2002). Further, the *Nationaler kompetenzorientierter Lernzielkatalog (NKLM [National competence-based learning objectives])* includes medical communication as a core competence of the medical profession (Medizinischer Fakultätentag der Bundesrepublik Deutschland e. V., 2021).

Medical interviewing is included in the *Approbationsordnung* (licensing regulations), but the assessment aspects here relate exclusively to history taking. Aspects such as building a trustworthy relationship and shared decision making are not mentioned (ÄApproO, 2002). The *Masterplan Medizinstudium 2020* (Masterplan Medical Education 2020) demands the expanded integration of medical communication competence into the curriculum and the *Approbationsordnung* (Wissenschaftsrat, 2018). These recommendations are considered in the Referentenentwurf des Bundesministeriums für Gesundheit for the new *Approbationsordnung*. The draft of the new *Appropationsordnung*, which is expected to be introduced in 2025, will include various aspects of medical communication, such as informed consent, respecting the patient's will, building an interpersonal relationship, and shared decision making, as exam-relevant competencies (Bundesministerium für Gesundheit, 2020).

The expanded integration of medical communication competence as an examination-relevant issue raises the question of how to assess medical communication competence reliably and validly. This question is very important for several reasons: (1) the instruments applied in the assessment should have sufficient psychometric properties and represent the multifaceted concept of medical communication (Epstein et al., 2005); (2) the number of perspectives on the medical interview should play a crucial role in a holistic assessment of medical communication competence (Donnon et al., 2014; Holmboe et al., 2010; Rotthoff et al., 2021); (3) the assessment has to distinguish between different performance levels and should be able to differ between competent and non-competent participants, for example, by means of defined threshold scores (Blömeke et al., 2015); and (4) according to the complex concept of (communication) competence, it is insufficient to draw conclusions regarding communication competence by only observing medical students' behavior in one medical interview; knowledge about and attitudes toward medical communication should also be considered (Blömeke et al., 2015; Frank et al., 2010).

The aim of this dissertation was to investigate the change in medical communication competence during undergraduate medical education (UME) using two innovative methodological approaches: on the one hand, performance in doctor-patient interviews was investigated in two cohorts of medical students by using a multitrait – multimethod approach (Schick et al., 2019), and on the other hand, students' attitudes toward doctor-patient conversation and attitude change during the clinical elective year were explored by applying the Q methodology (Schick et al., 2021).

The first objective of the dissertation was to provide a valid and reliable assessment of medical communication competence of first- and final-year medical students in a multitrait – multimethod approach by using medical students' self-appraisal, standardized patients' view, and external video assessment by trained raters. To examine medical

communication competence from different perspectives, the Kalamazoo Communication Skills Assessment Form (KCSAF) was adapted for German-speaking countries for medical students' self-appraisal, standardized patients' views, and an external video assessment through trained raters (Schick et al., 2019).

Different instruments to assess communicative competencies have been developed in recent years (e.g., Krupat et al., 2006; Kurtz et al., 2003; Rider, 2010). The majority of these instruments were developed to assess medical communication competencies that predominantly relate to one perspective on medical interviews. Medical communication competencies are assessed either from the external rater perspective (e.g., Krupat et al., 2006; Kurtz & Silverman, 1996) or from the (standardized) patients' views (S. W. Mercer et al., 2004; Neumann et al., 2008; Terry et al., 2007; Wilkinson & Fontaine, 2002). The global rating scale considers two perspectives—external raters and standardized patients (Scheffer et al., 2008). Instead of using only one method or perspective, Miller (1990) emphasized that different methods should be used to measure the complexity of medical professional competence (Cruess et al., 2016). A multirater approach for assessing medical communication competencies was developed by Calhoun et al. (2009): the Kalamazoo Communication Skills Assessment Form (KCSAF). The instrument considers multiple perspectives on (simulated) medical interviews (Calhoun et al., 2009). These perspectives are the views of faculties, nurses, peers, communication experts, and standardized patients, as well as medical students' self-appraisals.

Thus, this dissertation aimed to provide a reliable and valid multitrait – multimethod assessment capable of describing differences in medical communication competence of medical students in their first clinical year and in their final clinical year.

Previous studies have investigated changes in medical communication competencies through different training concepts. These studies have revealed that communication can be learned and trained instead of solely depending on individual dispositions, such as personality or talent (Bauer et al., 2018; Berkhof et al., 2011; Boissy et al., 2016; Hulsman et al., 1999; Kurtz et al., 2016). However, these studies have explored changes in communication competence over relatively short periods of time. However, less is known about the change in medical communication competence over longer periods, for example, during the years of UME.

To investigate changes in communication competence, students' performance in (simulated) medical interviews should be explored together with their attitudes toward medical communication. Attitudes are related to one's behavior in certain situations, and attitudes can develop through experiences and applied behavior (Ajzen et al., 2019; Bohner & Dickel, 2011; Hulsman et al., 1999; Woloschuk et al., 2004). Previous research has emphasized the influence of attitudes on behavior as an important factor in successful

patient encounters (Busch et al., 2015). Recent studies, however, have investigated either attitudes toward communication training (Busch et al., 2015; Rees et al., 2002) or attitudes toward patient-centered communication (Haidet et al., 2002; Kiessling et al., 2014). Currently, no known study has examined attitudes toward the explicit behavioral aspects of medical interviews.

The second objective of the dissertation attempted to fill this gap and aimed to achieve deeper insights into attitudes toward medical communication as intrapersonal resources of (communication) competence and the change in these attitudes during the clinical elective year by exploring attitude profiles at three time points using Q methodology (Schick et al., 2021).

To measure attitudes, different approaches were applied, including questionnaires with Likert scales or semantic differential (Cross, 2005) and Q methodology (Cross, 2005; Watts & Stenner, 2012). The Q methodology combines elements of qualitative and quantitative research to measure the attitude profiles of certain cohorts (Watts & Stenner, 2012). In this dissertation, the Q methodology was used in a longitudinal design, a methodologically innovative approach. Thus, this dissertation also contributed to the further development of the Q method. The study was conducted in the clinical elective year. The clinical elective year could be described as the grand finale of UME, in which students have the opportunity to transfer their theoretical knowledge into practice in a relatively protected environment. The students do not yet have the legal responsibility for patients, as they will have licensed physicians. At this stage of UME, formal learning is increasingly being replaced by informal learning. Despite its importance in UME, the clinical elective year has rarely been the subject of investigation in medical education research. Due to the high proportion of practical experience and the different practice situations, it can be assumed that the clinical elective year can have a promising influence on the change in attitudes.

In summary, the dissertation reveals insights into the change in communication competence in general and the change in attitudes toward medical communication in particular. To this end, the focus of the dissertation lies in advancing the research on clinical communication at the methodological level by adopting and validating an instrument to measure communication competence in a multirater approach and by applying the Q methodology to a longitudinal design.

2. Theoretical framework and state of research

2.1 Competence and competency in medical education

Different competence definitions of the medical and higher educational research agree upon four main characteristics that define competence: (1) different abilities (*competencies*) form the basis of a competence (multidimensionality); (2) these competencies are observable and assessable; (3) competence are context-specific; and (4) competence and competencies "changes with time, experience, and setting (Frank et al., 2010, p. 641; Blömeke et al., 2015; Frank et al., 2010; Koeppen et al., 2008; Rotthoff et al., 2021; Shavelson, 2010).

Frank et al. (2010) summarize these four aspects in one definition of competence. They define competence as

> "the array of abilities across multiple domains or aspects of physician performance in a certain context. Statements about competence require descriptive qualifiers to define the relevant abilities, context, and stage of training. Competence is multi-dimensional and dynamic. It changes with time, experience, and setting."
>
> (Frank et al., 2010, p. 641).

This definition of competence is rather a holistic construct of competence. To assess this complex construct, less complex competencies describing a competence should be defined. Competencies includes knowledge, skills and attitudes (Blömeke et al., 2015; Frank et al., 2010; Hartig, 2008). Because these competencies can vary in strength within a competence, competence is considered as *multidimensional* (Blömeke et al., 2015; Frank et al., 2010). Since competencies are assumed to be observable and measurable, research currently infers the level of a competence on the basis of these measurable competencies (Blömeke et al., 2015; Swing, 2010). Competences are context-specific (Frank et al., 2010; Koeppen et al., 2008). Context-specificity relates to a person's successful performance in a particular situation or context (Koeppen et al., 2008). The context seems to be an aspect that determines the changeability of competence.

Further, it is assumed that experience and thus time also determine changeability. However, there is still little evidence of how competencies develop. Competencies can develop linearly and in parallel, but they can also come to a completely different structure of competencies within the competence (Blömeke et al., 2015). Expertise research shows, for example, that the cognitive patterns in solving a task differ strongly between novices and experts (Schmidt & Boshuizen, 1993; Schmidt & Rikers, 2007). This could suggest implications for competence development (Blömeke et al., 2015).

Based on these characteristics of competence and competencies, this dissertation contributes to defining medical communication competence as a multidimensional latent construct that can be measured by concretely observable knowledge, skills, and attitudes (competencies). These competencies are successfully applied in doctor–patient encounters (context) and might be changeable based on recurring training situations (time and experience).

2.1.1 The construct of medical communication competence

In accordance to the general definition of competence and competencies, frameworks of medical communication competence also consider skills, knowledge, and attitudes as intrapersonal resources of observable competencies (Frank et al., 2015; Swing, 2007). However, these frameworks have described only the observable competencies needed to conduct a medical interview successfully. The supposed influence of attitudes on the successful performance of a medical interview has been less considered. Medical communication is an important facet of physicians' overall professional competence.

Three frameworks have defined the core competencies or professional roles physicians are required to perform (CanMEDS: Frank et al., 2015; NKLM: Medizinischer Fakultätentag der Bundesrepublik Deutschland e. V., 2021; ACGME: Swing, 2007). All three frameworks include interpersonal and communication competencies and patient care (ACGME: Swing, 2007), or the role "communicator" (CanMEDS: Frank et al., 2015; NKLM: Medizinischer Fakultätentag der Bundesrepublik Deutschland e. V., 2021). The role "communicator" is one of seven CanMEDS roles named *metacompetency*. These metacompetencies consist of *key competencies,* which are "essential abilities" of performing a successful doctor-patient conversation. The key competencies of a "Communicator" are building a trustworthy interpersonal relationship, gathering and sharing information, shared decision making, and documentation of relevant information. Each key competency is described by several *enabling competencies*. These enabling competencies contain different skills, knowledge, and attitudes needed to perform the particular key competency successfully (Frank et al., 2015). The key competencies and the enabling competencies are in line with essential elements of communication models developed in the last decades (e.g., Brunett et al., 2001; Frankel & Stein, 1999; Kurtz & Silverman, 1996).

Kurtz et al. (2016) provided an additional classification of communication competencies. They distinguished between *content skills*, *process skills,* and *perceptual skills* (Kurtz et al., 2016). Content skills refer to the matter of conversation through gathering and providing information and a treatment plan, whereas process skills enable the appropriate structure of the conversation, applying verbal and non-verbal skills, and developing a trustworthy interpersonal relationship with the patient (Kurtz et al., 2016,

p. 32). Perceptual skills include internal processes of physicians, such as problem-solving, clinical reasoning, and internal decision making, as well as attitudes and beliefs (Kurtz et al., 2016, p. 32).

A remarkable aspect of this classification, according to Kurtz et al. (2016) is that inner values, attitudes, and beliefs are explicitly covered by the category “perceptual skills”. Although attitudes are often referred to in the competence frameworks of ACGME and CanMEDs, they are only mentioned implicitly. This dissertation covers both aspects: medical communication competence is built upon a latent construct of observable competencies, and attitudes toward medical communication as intrapersonal resources are investigated.

2.1.2 Attitudes as intrapersonal resources of medical communication competence

Following the concept of competence as addressed in this dissertation, attitudes are conceptualized as one intrapersonal resource of professional competence, and attitudes have an impact on observable competencies. The construct “attitude” is a largely described and elaborated construct in social psychology research (Albarracín et al., 2019; Bohner & Dickel, 2011; Fabrigar et al., 2019; Haddock & Maio, 2014).

Attitudes can be defined as “an evaluation of an object of thought” (Bohner & Dickel, 2011, p. 392). The evaluation is based on underlying information. This information can be cognitive, affective, or behavior-related. Cognitive information refers to the beliefs and ideas that a person has toward an object. The affective information contains the feelings and emotions that an object evokes. Finally, behavioral information represents certain behaviors associated with an object (Fabrigar et al., 2019; Haddock & Maio, 2014; Maio et al., 2019). This information is used to form an attitude toward an object to perform different functions (Ajzen et al., 2019; Haddock & Maio, 2014; Maio et al., 2019).

Current research findings postulate six functions of attitudes: (i) the *knowledge function* refers to attitudes that represent information about the object of interest, (ii) *utilitarian function* relates to attitudes which judge about benefits and detriments of the attitude’s object, (iii) *ego-defensive function* represents the self-protection attitudes, (iv) *value-expressive function* defines attitudes of the self-concept of a person, and (v) *social-adjustment function* relates to attitudes that distinguish whether a person likes another person or not, and (vi) *object-appraisal function* summarizes positive and negative attributes of the attitude’s object (Ajzen et al., 2019; Haddock & Maio, 2014; Maio et al., 2019).

These evaluative judgments vary in valence and strength. Valence describes either a positive or a negative judgment, while the strength of an attitude refers to the stability,

changeability, and influence of the attitude on behavior (Maio et al., 2019). The stronger or more pronounced an attitude, the more observable the behavior that corresponds to this attitude (Maio et al., 2019). The aspects of valence and strength refer to the dimensions of attitudes (Albarracín et al., 2019; Fabrigar et al., 2019). Additional dimensions include the importance, certainty, and accessibility of attitudes (Albarracín et al., 2019). All dimensions have an influence on the changeability of attitudes. The more pronounced these dimensions are, the more difficult it is to change an attitude, and the more likely the attitude is to predict the behavior (Albarracín et al., 2019; Bohner & Dickel, 2011).

An often-cited concept to describe the influence of attitudes on behavior is the theory of planned behavior (TPB; Ajzen, 1991; Ajzen et al., 2019; Maio et al., 2019). The theory postulates the relationship between behavior, intention, attitudes, subjective norms, perceived behavioral control, and beliefs:

(1) Behavior is influenced by intention; for example, if a physician intends to share sufficient information with the patient, it is likely that the physician will do so.

(2) Intention is predicted by attitude toward the behavior, subjective norms, and perceived behavioral control. The intention to share sufficient information again is predicted by the physician's attitude about sharing sufficient information with the patient, whether there is a perceived expectation from society or legal regulations to provide sufficient information to the patient (subjective norms). Perceived behavioral control depends on the physician's confidence about sharing sufficient information. Thus, factors that influence the intention to provide sufficient information include whether the physician has a positive attitude about sharing sufficient information, whether subjective norms require sharing sufficient information, and whether the physician feels confident in offering enough information.

(3) Attitude, subjective norms, and perceived behavioral control are influenced by behavioral, normative, and control beliefs, which refer to a wide range of additional factors, such as individual (e.g., personality), social (e.g., culture), and information (e.g., knowledge) factors (Ajzen et al., 2019).

The process of whether attitudes predict behavior can be illustrated by the MODE model (Ajzen et al., 2019; Fazio, 1990). According to the MODE model, motivation and opportunity determine either a spontaneous or deliberative path from attitude to behavior (Ajzen et al., 2019; Fazio & Olsen, 2014). If a person is motivated and has the opportunity to deliberately reflect on a behavior and make the attitude visible through appropriate behavior in various situations, then the behavior will be in line with the underlying attitude (deliberative processing mode). If a person is not motivated or does not have the opportunity to consciously activate the respective attitude, then the strength of the attitude determines whether the behavior corresponds with the attitude (spontaneous processing

mode). A strong attitude is more likely to be spontaneously activated, resulting in corresponding behavior. However, if the attitude is weak and a spontaneous reaction is required, the likelihood that the behavior will reflect the attitude is low (Ajzen et al., 2019; Maio et al., 2019).

Applying this model to physician's behavior in medical interviews could mean that if a doctor had several prior opportunities to activate the respective attitude and is motivated to conduct an appropriate conversation, then the observable competencies might be in line with the attitudes toward the certain behavior. Unfortunately, it is well known that the time for a medical interview is limited (e.g., Becker et al., 2010); thus, the process could occur spontaneously, and only strong attitudes are reflected in the behavior. With the assumption that we can distinguish between strong and weak attitudes, we can also suppose that (pre-service) physicians have some strong attitudes, as well as some weak or ambivalent attitudes, regarding particular aspects of medical communication.

In summary, the main characteristic of attitudes is that they are assumed to predict behavior; this prediction depends on the attitude's strength and valence. The strength of an attitude predicts its changeability. These characteristics are consistent with the definition of medical communication competence referred to in this dissertation. Competencies are measured through observable behaviors in medical interviews; these behaviors might be influenced by attitudes. Competencies and attitudes are assumed to change over time. Thus, in this dissertation, we assume that attitudes are important intrapersonal resources of medical communication competence. However, medical education research has focused on attitudes toward learning or training communication competence as well as attitudes toward communication as one aspect of medical profession rather than on attitudes toward doctor-patient communication itself (Batenburg & Smal, 1997; Hajek et al., 2000; Lumma-Sellenthin, 2013; Muddiman et al., 2019; Rees et al., 2002). Less is known about the internal structure of attitudes toward the behavioral aspects of medical interviews. This dissertation addresses the question of how to describe the structure of attitudes toward medical interviewing among senior medical students.

2.2 Attitude change

Empirical findings about training in communication competence provide initial evidence that communication competence is changeable through training intervention (Bauer et al., 2018; Berkhof et al., 2011; Boissy et al., 2016; Hulsman et al., 1999; Kurtz et al., 2016). Research on expertise development also highlights how competence can be improved or even changed during professional careers. Gaining competence in a certain domain can be facilitated by different learning conditions. Such learning conditions are

clearly defined learning goals, motivation, receiving feedback, and a great amount of learning opportunities (Ericsson, 2008). These learning opportunities are characteristic of the clinical elective year. Previous research has also emphasized that the attitudes of young professionals or career starters are less stable than the attitudes of experienced professionals, and therefore are more likely to change (Haddock & Maio, 2014). However, research on attitude changes during UME is scarce. A research objective of this dissertation was to explore how attitudes toward medical communication change during the clinical elective year.

Current research findings describe attitude change as being caused by cognitive, affective, and behavioral issues (Maio et al., 2019). Cognitive aspects refer to new information about an attitude object. The re-evaluation based on new information is illustrated in the elaboration likelihood model (ELM; Bohner & Dickel, 2011; Petty & Cacioppo, 1986; Stroebe, 2014). This model differentiates between a central and a peripheral path to re-evaluation or elaborating new information concerning an attitude object (Petty & Cacioppo, 1986). The ELM supposes that the central path is activated by a thorough elaboration of new information. A high elaboration likelihood results in a sustained change in attitude, and such an attitude, in turn, can predict behavior. In contrast to the central path, the peripheral path is activated through poorly considered inferences and can result in affective conclusions. These affective conclusions are due to a low elaboration likelihood (Petty & Cacioppo, 1986). Comparable assumptions are described in the PAST Model (Past Attitudes are Still There, Petty et al., 2006). The model also describes a re-evaluation of attitudes through elaborating on new information; as a result, old attitudes could become invalid but still remain in memory (Petty et al., 2006). In this dissertation, attitude change based on cognitive aspects is assumed to occur when, for example, the teacher or supervisor provides feedback to the medical student on the doctor–patient conversation conducted. Attitude change could then occur when the student re-evaluates his or her attitudes based on the feedback.

In addition to cognitive aspects, emotions, and moods are assumed to predict attitude change. Such affective-associated attitude changes can be described by evaluative conditioning (EC, Houwer, 2007). Research on EC assumes that EC occurs when a pleasant or unpleasant object (unconditional stimulus (US)) is paired with a neutral object (conditional stimulus (CS)). Thus, CS obtains the evaluative attributes of the US (Bohner & Dickel, 2011; Houwer, 2007; Hütter & Fiedler, 2016). An example of attitude change based on EC in UME could be that medical students learn that smiling (US) is an expression of showing empathy (CS) in certain situations. If smiling is positively evaluated, then the student could adopt this positive evaluation of smiling on his or her attitude toward showing empathy.

Mere exposure is also affectively related to attitude change. Mere exposure describes the phenomenon that the more a person is confronted with an object, the more his or her attitude toward that object changes toward a positive evaluation (Zajonc, 1968, 2001). Relating this theory to attitude change to the scope of this dissertation, attitude change could occur once students are required to have repeated physician–patient conversations.

The role of behavioral impact on attitude change refers to the theory of cognitive dissonance (Festinger & Carlsmith, 1959; Harmon-Jones & Harmon-Jones, 2007; Maio et al., 2019). This theory proposes that contradictory information or a lack of correspondence between the behavior and the associated attitude leads to cognitive dissonance. If cognitive dissonance is strong, people might change their attitudes to coincide with their behavior again (Harmon-Jones & Harmon-Jones, 2007). In particular, the clinical elective year presents many opportunities to gain experience in conducting medical interviews. The students might be confronted with situations in which their requested behavior does not coincide with their attitudes. To compensate for this imbalance and avoid cognitive dissonance, they need to change their attitudes.

In the context of this dissertation, we assume that these theories could be supported by the learning conditions of the clinical elective year. Theories of workplace learning (WPL) are useful for characterizing learning in the clinical elective year. WPL can be described as learning conditions provided in the workplace that foster or restrain the cognitive, behavioral, and affective development of employees through work-related activities and guidance by experts or co-workers (Billett, 1996, 2001; Kyndt et al., 2009). Research on WPL differentiates between formal, non-formal, and informal WPL (Billett, 1996, 2001; Eraut, 2004; Tynjälä, 2008).

For formal WPL, a supervisor or teacher formulates specific learning objectives. These learning objectives are trained in a planned and deliberate way, such as in workshops or seminars (Eraut, 2004). Non-formal WPL can also be implemented with clearly defined learning goals and takes place under the supervision of a mentor or teacher but in a less formal setting in the workplace. Instead of knowledge acquisition, practical skills are trained in non-formal WPL settings (Kyndt et al., 2009). Informal WPL is characterized by the missing of learning objectives, of any supervisor or mentor, and of an appropriate learning setting. It takes place in the workplace without any given structure (Kyndt et al., 2009).

All three types of workplace learning transfer theoretical knowledge into professional tasks and behavior in practice. This transfer emerges as a new behavior. Hence, if this new behavior is not in correspondence or even connected with an underlying attitude, it might elicit attitude change or even formation (Harmon-Jones et al., 2019). This phenomenon is

described in self-perception theory, which emphasizes that new attitudes are built upon a person's observation of their own behavior in a certain situation (Bem, 1972; Harmon-Jones et al., 2019; Maio et al., 2019). The perception of attitudes through one's own behavior is comparable to supposing another person's attitude by merely observing that person's behavior (Maio et al., 2019). This kind of attitude development facilitates the change of weak attitudes rather than of strong attitudes. (Harmon-Jones et al., 2019).

This dissertation refers to the assumption that learning conditions in the clinical elective year facilitate attitude change toward medical communication. Students might expand their knowledge of medical communication through supervision due to the non-formal WPL character of the clinical elective year (cognitive issues) and experiences in medical interviews during their daily work in the wards (behavioral issues). The recurring tasks during daily work (e.g., history taking, informed consent interview) could also lead to a change in attitude (affective issue, mere exposure).

2.3 Assessment of medical communication competence

A multirater assessment of medical communication competence enables the combination of an analytic and a holistic perspective on medical students' performance in doctor–patient conversations. To assess competence, researchers differentiate between an analytic and a holistic approach (Blömeke et al., 2015; Rotthoff et al., 2021). The analytic approach has its origin in psychological and pedagogical research (Blömeke et al., 2015; Koeppen et al., 2008; Rotthoff et al., 2021). This approach decomposes a competence into its components (competencies) and measures these competencies in context-specific situations using reliable and valid instruments (Rotthoff et al., 2021). In contrast to the analytic approach, the holistic approach initially aimed to measure competence in real-life situations. The aim of the approach is no longer to decompose a competence in its competencies (e.g., to greet the patient, to summarize at the end of the conversation) or to assess these competencies but to measure a competence (e.g., medical communication competence) from different perspectives (e.g., faculties, peer, simulated patients) that are required for the successful performance of a domain-specific activity (e.g., medical interview; Rotthoff et al., 2021). The holistic approach is being increasingly applied in medical education (UME: Prediger et al., 2020; Wijnen-Meijer et al., 2013; GME: Berberat et al., 2019). However, as is the case with the analytical approach, to successfully assess competence holistically, reliable and valid measures are also needed (Rotthoff et al., 2021).

The assumption that competence refers to observable competencies in a given situation raises the question of when a person is competent. Blömeke et al. (2015) differentiated between a horizontal approach and a vertical approach. In addition to

assuming that a person is competent or not (horizontal approach), educators, and researchers should also consider how competent a person is (vertical approach). The vertical approach refers to the extent of competence that a person shows (Blömeke et al., 2015). The vertical and horizontal approaches imply the multidimensional nature of the construct "competence" (Frank et al., 2010). With the assumption of multidimensionality, a person is less competent in one competency but more competent in another competency of the overarching competence (Blömeke et al., 2015). As an example, this dissertation refers to communication competence as a multidimensional construct, which includes, among others, the competencies "using appropriate communication techniques," "applying techniques for gathering information," and "building a trustworthy doctor–patient relationship." Referring to the vertical approach, a physician could demonstrate a satisfactory way of using appropriate communication techniques, such as using appropriate question techniques or using comprehensible language. He or she achieves a high score on this competency but may not be able to build a trustworthy relationship with the patients in a sufficient manner. According to this dilemma, the question arises whether the underlying competencies of the overarching competence "medical communication" can be summed up to an overall score to assume that a person is competent in communicating with patients (horizontal approach). Moreover, this dilemma highlights the difficulty of defining a threshold for a competence above which a person is "adequately" or "sufficiently" competent (Blömeke et al., 2015). An overall score would imply that the different competencies could compensate for each other. Applying this assumption to communication competence in particular would imply that a high score on using appropriate communication techniques would compensate for a low score in building a trustworthy doctor–patient relationship. However, this assumption is critical for medical communication competence. It might be possible to conduct a successful doctor–patient dialogue while compensating for a high competency in gathering information with a low competency in using appropriate communication techniques; however, the other way around may not result in a successful medical interview. Furthermore, it might also be difficult to compensate for low empathy competency with high gathering information competency.

Different assessment methods describe how to assess communication competence by examining the competencies on a Likert scale or via a checklist (for an overview: Kurtz et al., 2016; Rider, 2010). Additional assessment measures are patients' experience questionnaires and knowledge and attitude tests (Duffy et al., 2004; Rider, 2010). Knowledge and attitude tests, such as the Jefferson Scale of Physician Empathy or the Interpersonal Reactivity Index, mainly assess interpersonal resources and empathy in a more analytic manner (Hojat et al., 2005). However, these instruments do not provide a threshold for distinguishing between competent and less competent medical students.

Checklists and rating scales predominantly build upon different frameworks or consensus statements (e.g., Brunett et al., 2001; Frankel & Stein, 1999; Kurtz & Silverman, 1996). Checklists and rating scales are used mainly to capture the views of externally trained raters, faculties, or communication experts to examine the communication competencies ad hoc (e.g., OSCE) or post hoc (e.g., video-taped (simulated) conversations, Duffy et al., 2004). Examples for this category are the Calgary Cambridge Guide (CCG, Kurtz et al., 2003) , the MAAS-Global (van Dalen et al., 2002), and the four-habit coding scheme (4HCS, Frankel & Stein, 1999; Krupat et al., 2006). Other instruments developed to assess the (standardized) patient perspective like Communication Assessment Tool (CAT, Makoul et al., 2007) and the consultation and relational empathy (CARE) measure (L. M. Mercer et al., 2008; Neumann et al., 2008).

The Kalamazoo Communication Skills Assessment Form (KCSAF) provides one scale for multirater assessment and feedback (Rider, 2010). The instrument contains items that cover different competencies in medical communication. These items are in line with the construct of interpersonal and communication competence of the ACGME (Rider, 2010) and are based on Kalamazoo consensus statements (Brunett et al., 2001). The measure can be used to assess the student's self-appraisal, the standardized patient's view, the peers' observations, and the faculty's and external rater's perspective (Peterson et al., 2014). Different raters can provide a holistic view of medical communication competence, whereas self-appraisal fosters the reflective ability of a (pre-service) physician (Calhoun et al., 2009; Calhoun et al., 2010). By covering different perspectives, the strengths of one perspective can compensate for the weaknesses of another (Calhoun et al., 2009).

Unfortunately, the KCSAF is not available for German-speaking countries, and there has been no comparable German instrument that measures medical communication competence from different perspectives so far. This dissertation fills this gap by adapting and initially validating a German translation of the KCSAF, considering the perspectives of external raters, standardized patients, and the self-assessment of medical students. With the adaptation of the KCSAF for German-speaking countries, this instrument combines an analytic and holistic approach. The analytic approach was applied by ensuring a valid and reliable instrument, while the holistic approach was leveraged using different perspectives in simulated medical interviews.

2.4 Assessment of medical communication attitudes

The degree of communication competence is inferred by observing individual competencies as facets of overarching competence. Similarly, to measure attitudes, it is possible to indirectly infer how a person's attitudes are structured by asking relevant

questions (Maio et al., 2019). Maio et al. (2019) differentiated between implicit (indirect) and explicit (direct) assessments. The two types of attitude measures differ in the degree of the participants' awareness of attitude assessment. A direct or explicit assessment of attitudes fosters awareness of such an attitude measure, whereas an indirect or implicit assessment avoids the participants being aware of the attitude measurement (Maio et al., 2019). One often applied explicit assessment method of attitudes in psychological and educational research is Likert scales (Cross, 2005; Joshi et al., 2015; Likert, 1932; Maio et al., 2019; Sullivan & Artino, 2013). Likert scales assess attitudes on, for example, 5–7 levels between two end points, such as "applied" and "does not applied" (Joshi et al., 2015). To gain a certain "level of attitude," the answers to a certain number of statements are summed up to an overall score. This overall score enables the researcher to compare different participants with each other in relation to the attitude under consideration (Joshi et al., 2015; Sullivan & Artino, 2013).

Likert scales are often used in questionnaires and rating scales that assess attitudes in medical education research. Two examples of measures of attitudes toward medical communication are the Communication Skills Attitude Scale (CSAS; Busch et al., 2015; Rees et al., 2002) and the Patient-Practitioner Orientation Scale (PPOS; Haidet et al., 2002). CSAS can be applied to measure attitudes toward training communication competence in UME (Busch et al., 2015; Rees et al., 2002). The CSAS rating scale differentiates between positive and negative attitudes (Busch et al., 2015; Rees et al., 2002). The positive subscale includes attitudes that communication training fosters the development of communication and interpersonal competence, that communication training is relevant and an important aspect of UME, and that communication training is conducted in an engaging and entertaining way. The negative subscales cluster attitudes toward communication training as "a social science subject" (Rees et al., 2002, p. 145), toward the students' unwillingness to train communication competence, toward the non-seriousness of communication training, and toward the assessment of communication competence (Rees et al., 2002).

A further focus of medical attitude research is on physicians' attitudes toward doctor–patient relationships. Haidet et al. (2002) compared the patient-centered attitudes of medical students at different educational levels. They used the PPOS, which consists of two scales. These scales are 'sharing' and 'caring'. The 'sharing' scale refers to the aspect of providing information by the physician as well as ensuring the patient's and physician's mutual control of the course of the conversation. The 'caring' scale refers to building a trustworthy interpersonal relationship between physician and patient. The higher the values of both subscales, the more patient-centered attitudes expressed (Haidet et al., 2002).

Responses to questionnaires about the interpersonal relationship between doctor and patient could be strongly influenced by social desirability. Social desirability bias could appear if the respondents tend to answer according to social norms and to the perceived expectations of the interviewer or researcher (impression management), or if respondents answer to deceive themselves and describe an image of themselves as they would like to be (self-deception; Krumpal, 2013; Moosbrugger & Kelava, 2020; Paulhus, 1984). Socially desirable respondents can negatively affect the quality of the data and, thus, the accuracy of the results (Krumpal, 2013).

Another aspect that might affect the validity of the attitude measure is measuring different attitudes with different Likert scales. Attitudes are rated independently of each other on these different scales. Comparing measures of attitudes with different scales is crucial because a higher mean value in attitude A than in attitude B does not necessarily imply that attitude A is stronger than attitude B (Maio et al., 2019). To show the relationship between different attitudes within a certain overarching topic, such as medical communication, and to reduce response bias, such as social desirability, Q methodology is a promising approach for measuring attitudes toward medical communication.

The Q method can quantitatively measure subjectivity (S. R. Brown, 1993; Müller & Kals, 2004; Stephenson, 1993; Watts & Stenner, 2012). To measure subjectivity refers to measuring the attitudes or viewpoints of a person toward a certain topic (S. R. Brown, 1996; Cross, 2005). Thus, response bias due to social desirability is less likely to distort the results of the Q study due to the assumptions upon which the Q method is based. Q methodology researchers refer to theories of constructivism and constructionism. Constructivism assumes that people are not able to perceive the world objectively but instead see the world as influenced by individual experiences and social circumstances. Constructionism considers the social and sociological aspects that determine these individual viewpoints and attempts to identify shared viewpoints that exist within a group about a given topic (Watts & Stenner, 2012). Since both theories describe the formation of viewpoints based on subjective perceptions, social desirability seems to be less likely to bias the study results. Even if respondents answers are supposedly socially desirable, their answers identify the aspects they perceive as socially desirable and thus consider to be important for the individual (Yang & Montgomery, 2013)

To examine the viewpoints or attitudes of a person using Q methodology, a set of statements is collected that refer to an overarching topic but are content-related and heterogeneous (Watts & Stenner, 2012). By sorting the heterogeneous statements, “a given participant brings a hitherto novel homogeneity to these items” (Watts & Stenner, 2012, p. 31).

Two types of Q-sorting procedures can be applied: forced-choice ranking or free distribution. The most famous Q-sorting procedure is forced-choice ranking, in which the researcher provides a normal distribution grid to the participants. The normal distribution grid contains a range of positive and negative judgment levels, that is, from important (+3, +2, +1) across neutral (0) to unimportant (-1, -2, -3). Each level is assigned a certain number of statements—the number of statements increases from positive to neutral and decreases from neutral to negative (Watts & Stenner, 2012). This restriction is not given in the free distribution. The free distribution allowed the participants to sort any number of statements to the given levels of judgment. Prima facie, the lack of restrictions allowed the participants to sort the statements completely according to their attitudes. However, this requires the high cognitive performance of the participants (Watts & Stenner, 2012). Such high cognitive performance does not support a relevant increase in information about the attitude profile. To reduce the cognitive strain of participants, forced-choice ranking is recommended (Watts & Stenner, 2012).

After sorting the statements into a normal distribution grid (Q-sort), the individual Q-sorts were examined using Q-factor analysis. The Q-factor analysis compares the Q-sorts of the individuals to obtain a few overarching attitude profiles. The attitude profiles represent the different viewing points of the study cohort. These profiles or viewing points are interpreted qualitatively and described narratively. The interpretation considers the statements dependent on each other based on their position in the profile (Watts & Stenner, 2012). The Q-factor, or by-person, analysis thoroughly compares person-related differences (Watts & Stenner, 2012).

In the last two decades, the Q method has been increasingly established in health science research. It is used to collect data on patient or public health-related questions of (McHugh et al., 2015; Stenner et al., 2015; van Exel et al., 2015) or to investigate the attitude profile of physicians and health care providers regarding diverse health- or profession-related topics (Márquez-Álvarez et al., 2021; Muddiman et al., 2019; Prasad, 2001).

By applying the Q methodology, this dissertation provides deeper insight into different attitude profiles in a cohort of medical students in their final year. The attitude profiles reveal the interdependence of different aspects of medical communication.

3. The present research

The aim of the dissertation was to gain deeper insights into the change of the communication competence of medical students through a multitrait – multimethod approach and to deeply examine attitudes toward medical communication. To investigate attitude changes during the clinical elective year, this dissertation considered workplace learning to be a meaningful learning condition in the clinical elective year (Eraut, 2004; Tynjälä, 2008).

The development of medical communication competence is assessed using two innovative approaches to medical education. (1) For the assessment of medical communication competence, the Kalamazoo Communication Skills Assessment Form (KCSAF, Rider, 2010) was adapted and validated for German-speaking countries. The instrument measured medical communication competence with a multitrait – multimethod approach, considering medical students' self-appraisal and the perspectives of simulated patients and external raters. (2) To examine medical students' attitudes toward medical communication, a Q methodology was applied. The Q method is a card-sorting procedure that discovers the attitude profiles of a given sample (Watts & Stenner, 2012). The attitude profiles were analyzed at three measurement points during the clinical elective year to investigate attitude development.

Two main research objectives are addressed in the present dissertation:

I. To shed light on how medical communication competence can be measured validly and reliably while integrating different perspectives on the conversation by examining changes in communication competence during UME (Journal Article A).
II. To research the attitudes of senior medical students toward medical communication and investigate how attitudes change during the clinical elective year (Journal Article B).

The study reported in Journal article A was conducted to address research objective I by investigating the following research questions:

RQ 1.1. Do the three instruments (KCSAF for self-appraisal (KCSAFd-self), standardized patients (KCSAFd-sPat), and trained raters (KCSAFd-video)) measure unidimensional constructs as the original KCSAF?

RQ 1.2. Do the German versions of the KCSAFd-self, for KCSAFd-sPat, and KCSAFd-video provide reliable data ($\alpha \geq .7$; $\omega \geq .7$)?

RQ 1.3. What correlative relationships exist between KCSAFd-self, KCSAFd-sPat, and KCSAFd-video?

RQ 1.4. Does the measured communication competence differ between medical students in their first clinical year and those in their last clinical year of undergraduate medical education?

Journal article B reports a study conducted to address research objective II by exploring the following research questions:

RQ 2.1. Which attitude profiles of senior medical students regarding physician–patient communication can be differentiated at the beginning of the final year of medical school?

RQ 2.2. How do these attitude profiles develop during students' clinical electives in the final year of medical school?

4. Methodology

4.1 Context of dissertation

This dissertation was part of the collaborative project ÄKHOM (Ärztliche Kompetenzen Hamburg Oldenburg München [medical competences – Hamburg Oldenburg Munich]) funded by the German Ministry of Education and Research (reference number: 01PK1501C). The ÄKHOM project aimed to develop a 360-degree competence-based assessment for senior medical students (Harendza et al., 2017; Prediger et al., 2020). The competence-based assessment was a simulated first day of residency and was conducted in July 2017. The students had to conduct five medical interviews with simulated patients at the beginning of the simulation, followed by a management phase in which the students developed diagnoses and treatment plans based on further examination results. Finally, the students had to hand over their patients to a simulated resident taking over the shift (for a detailed description of the simulation, see Harendza et al., 2017; Prediger et al., 2020).

Beyond the ÄKHOM-project, further data were collected in two additional contexts: (1) In the winter term of 2016/2017, simulated medical interviews of the seminar “Ärztliche Gesprächsführung 1” (ÄGF 1, Medical Interviewing 1) in the first clinical year of UME were video-recorded and investigated. The seminar consisted of three workshops with different topics. The first workshop focused on opening the conversation, the second workshop related to structuring the conversation, and Workshop 3 aimed to foster building interpersonal relationships and empathy. Each workshop started with an introduction to the topic (30 min.), followed by working in small groups and conducting two medical interviews with simulated patients (60 min.). Each small group had a medical or psychological lecturer who was an expert in medical interviewing. In each session, two students had the opportunity to conduct a simulated medical interview.

(2) In the clinical elective year 2017/2018, senior medical students were invited to participate in a longitudinal study. This study aimed to investigate medical students’ attitudes toward medical communication and attitude changes across the clinical elective year. The clinical elective year is divided into three trimesters– each trimester is about 16 weeks. Medical students spend one trimester each in surgery and internal medicine, and one trimester in an elective medical discipline.

4.2 Study A: Multi-method assessment of medical communication competence

The first study aimed to investigate the reliability and initial validity of the German adaptation of the Kalamazoo Communication Skills Assessment Form (KCSAFd) for the perspectives of medical student's self-appraisal (KCSAFd-self), standardized patient's view (KCSAFd-sPat), and video rating by trained external raters (KCSAFd-video) in two cohorts (Appendix C). One cohort comprised 66 medical students in their final year, who participated in the ÄKHOM study. In total, 40 students (52.50% female, age: *M* = 26.40, *SD* = 2.16) were at the end of their 10th semester, and 26 medical students (61.50 female, age: *M* = 25.46, *SD* = 2.19) were already in the clinical elective year. The second cohort consisted of 97 medical students (61.90% female, age: *M* = 23.09 years, *SD* = 2.94) in their first clinical year (semesters 5 and 6) at the TUM School of Medicine. The first clinical-year students participated in the seminar "Ärztliche Gesprächsführung 1" (Medical Interviewing 1).

To answer research questions RQ 1.1–1.4, the KCSAF was translated from English to German, following the guidelines and suggestions of the World Health Organization (World Health Organization, 2016) and Wild et al. (2005). Simulated medical interviews from the ÄKHOM-study and the ÄGF 1 seminar were video-recorded. In the ÄKHOM-study, the last conversation of the five simulated medical interviews was analyzed in the context of this dissertation. However, there was no systematic exclusion of videos collected in the context of ÄGF 1. In both cohorts, the students and the simulated patients evaluated the conversation immediately afterward by rating their performance using the KCSAFd-self (medical student's self-appraisal) or the KCSAFd-sPat (simulated patients' views), respectively. Finally, the videos were analyzed by external raters (KCSAFd-video). The external raters were trained extensively to achieve sufficient inter-rater reliability (ICC ≥ .67; Schick et al., 2019).

To answer the research questions and investigate the psychometric properties of the KCSAFd, different analyses were conducted. Descriptive analyses, mean differences, and effect sizes were conducted using IBM SPSS Statistics version 24.0 (IBM Corp., 2017). Confirmatory factor analyses for each perspective were run using Mplus 8 (Muthén & Muthén, 2017). Reliability was investigated by calculating Cronbach's alpha and McDonald's omega using IBM SPSS statistics version 24.0 (IBM Corp., 2017) and the MBESS package of R version 3.4.3 (R Core Team, 2014; Schick et al., 2019), respectively.

4.3 Study B: Attitude profiles and attitude changes in medical students toward medical communication

A second study was conducted among senior medical students in their clinical elective year in 2017/2018. The aim of this study was to investigate the attitude profile toward communicative behavior in medical interviews and the changes in these attitude profiles during the clinical elective year. The study consisted of three time points: t_1 at the beginning of the clinical elective year, t_2 after 24 weeks (in the middle of the clinical elective year), and t_3 at the end of the clinical elective year. A total of 47 senior medical students participated (68.10% female, age: M = 25.98 (SD = 2.37) years) at t_1. During the clinical elective year, the number of participants decreased slightly (t_2 = 37, t_3 = 36; Schick et al., 2021).

The attitudes of senior medical students toward medical communication were assessed using Q methodology (see Chapter 2.4). The Q study was conducted using the FlashQ-template (Hackert & Braehler, 2007). The Q-set consisted of statements gathered from the anchor statements of the KCSAFd (Schick et al., 2019; Schick et al., 2021). At the beginning of the clinical elective year, the participants sorted these statements into a normal distribution grid. Q-sorts emerged through the cart-sorting procedure and were analyzed using Q-factor analysis by clustering comparable Q-sorts into attitude profiles. The attitude profiles were described narratively by comparing the respective statement positions in the profile (see for more details Schick et al., 2021). The Q-sorting procedure was repeated at two additional time points during the clinical elective year. The profiles of t_2 and t_3 were also narratively described. To examine the change in attitudinal profiles during the clinical elective year, we matched each profile in t_1 with one profile from each of t_2 and t_3. Profiles were matched if they had a high correlation and the lowest number of distinguishing items. The number of distinguishing items describes the differences between the two profiles. The smaller the number of distinguishing statements, the greater the similarity between the profiles could be assumed to be (Watts & Stenner, 2012). The migration of participants between the factors at the time points is also described. The analyses were conducted using the R package “qmethod,” Version 1.5.4 (Zabala, 2018).

5. Summary of Publications

5.1 Journal Article A: "German language adaption of the Kalamazoo communication skills assessment form (KCSAF): A multi-method study of two cohorts of medical students"

The aim of the first study (Schick et al., 2019; see Appendix A) was to investigate psychometric properties of the German version of the KCSAF for the three assessment methods: medical student's self-appraisal (KCSAFd-self), standardized patient's view (KCSAFd-sPat), and external video rating (KCSAFd-video). Unlike a one-method approach, considering different methods in assessing medical communication competence could provide a more holistic picture of medical students' communication competence (Rider, 2010). The three measures were applied to assess the medical communication competence of two medical students' cohorts at different educational levels (cf. chapter 4) to answer research questions 1.1 to 1.4.

RQ 1.1 addressed whether the three instruments measured a unidimensional construct like the original English assessment form. Unidimensional models could not be confirmed. Instead, two-factorial models with latent factors labeled *interpersonal competence (IPC)* and *conversational competence (CC)* provided better model-fit data. The items referring to IPC were comparable with other empathy measures, such as consultation and relational empathy (CARE; S. W. Mercer et al., 2004) or the Jefferson scale of physician empathy (JSPE; Hojat et al., 2002). The CC scale encompassed the communicative competencies needed for a successful medical interview (Brunett et al., 2001; Kurtz et al., 2003).

RQ 1.2 was addressed by investigating whether the reliability of the measures and their factors examined internal consistency using Cronbach's alpha and McDonald's omega. Both methods seemed to provide acceptable reliability for all three measures.

The aim of *RQ 1.3* was to examine the correlative relationships between the three measures. The relationship between the three measures seemed to indicate that the different perspectives covered comparable facets of medical communication competence. Additionally, the small or even negative correlations between the CC_{self} and $IPC_{sPat/video}$ might show evidence of discriminant validity, as they measured different aspects of medical communication competence.

The objective of *RQ 1.4* was to explore the differences in measured communication competence between different medical education levels (first-year students vs. final-year students). A structural equation model with the method factor "first year vs. final year" suggested that final-year students received higher ratings than first-year students on all three measures and factors, despite the IPC factor of KCSAFd-video.

In summary, the adaptation approach of the KCSAF for German-speaking countries seemed to result in a psychometrically reliable and initially validated measure of communicative competence in undergraduate medical education. These findings contribute to the assumption that assessing communicative competence from different perspectives results in examining various aspects of communicative competence that might be overlooked by using only one method (Donnon et al., 2014).

5.2 Journal Article B: "Senior medical students' attitudes toward patient communication and their development across the clinical elective year – A Q methodology study"

In the second study (Schick et al., 2021, see Appendix B), the attitudes of senior medical students toward medical communication and how these attitudes changed during the clinical elective year were investigated. The clinical elective year is an intensive phase of UME in which students are trained to apply their theoretical knowledge in practice. However, research on informal workplace learning and the acquisition of competence in the clinical elective year is limited. In particular, empirical findings on the influence of attitudes on medical communication competence or communicative behavior and attitude changes during the clinical elective year are scarce in medical education research (Bombeke et al., 2011; Woloschuk et al., 2004). This research gap was addressed in the second study. Attitude profiles at the beginning of the clinical elective year (t_1; *RQ 2.1*) and how these attitude profiles changed across the year (t_2 + t_3; *RQ 2.2*) were investigated by applying Q methodology. The Q-method is used to examine attitudinal profiles within a sample and to determine the subjective opinions of the sample on a particular topic (Watts & Stenner, 2012).

The findings of this study indicated that three different attitude profiles were most suitable for our sample. At the beginning of the clinical elective year *(RQ 2.1),* the three profiles focused on different behavioral aspects of medical communication. Profile 1 focused on shared decision making and on communicating information in an appropriate manner. Profile 2 highlighted a trustworthy doctor–patient relationship as most important for a successful doctor–patient dialogue. Profile 3 emphasized structuring techniques and information gathering.

With *RQ 2.2,* we investigated the development of attitude profiles during the clinical elective year. Profile 2 remained relatively stable over time, both in terms of statement sorting and in terms of the low migration of participants. For Profile 2, it is notable that while shared decision making seemed to remain of medium importance, during the clinical elective year, students seemed to place more emphasis on involving the patient's family in

the decision-making process. The change in empathetic behavior in Profiles 1 and 3 might be remarkable. Both profiles seemed to show that some aspects of empathy might gain importance. Profile 1 seemed to gain importance in understanding the patients' perspective. Thus, all three attitude profiles suggested high importance toward shared decision making at all three measurement points.

Profiles 1 and 3 showed a higher degree of migration than Profile 2. There seemed to be an interchange of participants between Profiles 1 and 3 across the three measurement time points.

In conclusion, the findings of this study appear to provide the first insights into medical students' attitude profiles toward medical communication. At the end of the clinical elective year, participating medical students seemed to place great importance on showing empathy and sharing information. Further research could investigate whether these attitude profiles could be displayed in behavior. This study demonstrated an innovative approach to examining attitude changes over time by applying Q methodology.

6. Discussion

The focus of this dissertation was to develop innovative perspectives regarding the measurement of medical communication competence and its changes during UME. The first research objective was to investigate the assessment and change in medical communication competence in UME using a multitrait – multimethod approach. The second research objective was to examine the changes in medical students' attitudes toward medical communication during the clinical elective year by applying Q methodology. Both methodological approaches were based on the German version of the Kalamazoo Communication Skills Assessment Form (KCSAFd).

In what follows, we present a summary of the central empirical findings regarding the assessment and changes in medical communication competence based on a multitrait – multimethod approach (6.1) and Q methodology approach, including critical methodological reflection on these approaches (6.2), followed by implications of medical educational practice (6.3), discussing the limitations of the study (6.4) and the conclusion of this dissertation (6.5).

6.1 Empirical findings on the assessment and change of medical communication competence

This dissertation aimed to contribute to new empirical findings and deeper insights into the assessment and change of medical communication competence. In this dissertation, medical communication competence is defined as a latent construct measurable through observable competencies (skills, knowledge, and attitudes). A competent physician is able to appropriately perform a medical interview based on the content and purpose of the interview as well as the concerns and needs of the patients (Schick et al., 2019). To investigate medical students' communication competence, the Kalamazoo Communication Skills Assessment Form (KCSAF) was adopted and validated for German-speaking countries (KCSAFd). The KCSAFd provides an assessment of medical communication competence based on three measures—the student's self-appraisal (KCSAFd-self), the standardized patient's view (KCSAFd-sPat), and video rating through trained raters (KCSAFd-video). Factor analytical tests revealed a two-factorial model with two latent variables, "conversational competence" (CC) and "interpersonal competence" (IPC; Schick et al., 2019) as most suitable to the data. Modeling latent variables is a methodological innovation related to previous psychometric testing of the KCSAF. Previous studies have thus far assumed a one-dimensional model in which the researcher assumed unidimensionality based on internal consistency (Amaral et al., 2016; Calhoun et al., 2009; Peterson et al., 2014) and multirater reliability (Amaral et al., 2016; S.

D. Brown et al., 2017; Calhoun et al., 2009). Different perspectives and observers of medical interviews were compared, for example, students' self-appraisals, simulated patients, faculties, and peers (Amaral et al., 2016; S. D. Brown et al., 2017; Calhoun et al., 2009; Peterson et al., 2014). The relationship between the different observers was reported in a study by Calhoun et al. (2009). The other three studies reported an interclass correlation between peer observers and faculties (Amaral et al., 2016; S. D. Brown et al., 2017; Peterson et al., 2014). The students' self-appraisals, as well as the simulated patients' views, remained unconsidered in these studies. This dissertation contributes deeper insights into the relationships between the three measures of students' self-appraisal (KCSAFd-self), simulated patients' views (KCSAFd-sPat), and video analysis by trained raters (KCSAFd-video). The findings suggest a small to medium correlation between the three measures. However, to interpret these results, some aspects need to be considered: self-appraisal is assumed to facilitate the reflection abilities of (medical) students, especially whether students recognize the skills they still need to improve (Eva & Regehr, 2007). However, previous research has revealed evidence that less competent people are unaware of their lack of knowledge and overestimate their abilities in comparison to their more competent counterparts (Kruger & Dunning, 1999). With an increase in competence, the accuracy of self-assessment can increase with years of study and experiences (Blanch-Hartigan, 2010). In the present dissertation, final-year medical students appraised their performance higher than first clinical-year medical students. This is in line with the assessments of simulated patients and external video ratings, in which final-year medical students outperformed their younger counterparts.

However, the assessments by simulated patients and external video ratings can also be biased through different shortcomings. Simulated patients and external raters might assume a better performance of senior medical students than younger medical students, which might influence their ratings (Blanch-Hartigan, 2010). In particular, simulated patients assess in a benevolent manner (Donnon et al., 2014; McLaughlin et al., 2006). Further, rater errors have been reported, including halo effect, inconsistency, and the non-use of the entire rating scale (Iramaneerat & Yudkowsky, 2007; Wirtz & Caspar, 2002).

The third perspective under consideration is the external view of trained raters. The present study revealed that external raters seemed to be stricter than simulated patients (Schick et al., 2019). These findings seem to be in line with the extant research. Other studies have reported a more stringent assessment of medical students by external raters compared to simulated patient assessment (Lie et al., 2018). The reason for this phenomenon might be that the external rater was somewhat distant from the medical interview compared to the simulated patients. External raters are not part of the conversation; they can focus only on the interaction between physician and patient, as well

as on the performance of the physician, respectively (Lie et al., 2018). The simulated patients, by contrast, have to play their role, consider role-specific information and behavior, and react spontaneously to the physician's behavior and questions while simultaneously assessing the physician's performance. However, the perspective of (simulated) patients enhances the real-life approach (Calhoun et al., 2010) and thus, combining different perspectives offers a holistic assessment of medical communication competence in UME (Calhoun et al., 2009; Rotthoff et al., 2021).

By including different perspectives in the assessment and referring to a simulated, close-to-real-life situation, the assessment in our study combined the analytic and holistic aspects of measuring medical communication competencies. By adapting and validating the KCSAFd, analytic criteria were considered. We attempted to ensure the internal structure, reliability, and objectivity of the measures using modeling latent variables based on clearly defined aspects of behavior in medical interviews. As mentioned in the Introduction, what should be regarded as appropriate behavior in medical interviews depends upon the individual concerns and needs of specific patients and their diseases. Therefore, there is no gold standard for how to sufficiently communicate with patients in general; different behavioral suggestions exist to guide such an interview. The "art" of medical communication now lies in appropriately applying these suggestions in a given situation concerning patients' needs and complaints.

These assumptions influence the decision of how to assess these competencies. Since the nature of communication is subject to numerous influencing factors, it is not very useful to assume the same assessment conditions for all students. The raters must be able to take the framework conditions of the conversation into account. Thus, a high inferential assessment of competence via rating scales should be conducted. However, there is no "right" or "wrong" strategy for achieving this goal. High-inference rating scales imply qualitative decision making by raters about (medical) students' observed performance. This can reduce reliability and objectivity (Rotthoff et al., 2021). However, previous research has inferred that high inferential ratings increase the validity of the assessment because raters can put the observed behavior in context with the situation being observed (Seidel, 2005). To meet this criterion, the assessment of medical communication competence with the KCSAFd was conducted in a highly inferential manner (Schick et al., 2019), which is promising for assessing medical communication competence in simulated medical interviews (Wiesbeck, 2015).

By applying a high inferential scale, the study aimed to investigate the performance differences between first- and final-year students. The final-year students appraised their performance as better than the first-year students did based on the two scales—interpersonal competence and conversational competence. The simulated patients

assessed the performance of final-year students better than first-year students on both factors. The trained raters assessed the final-year student performance on the conversation scale as better than the first-year medical students' performance. However, only the trained raters did not observe any differences in empathetic behavior between first- and final-year medical students (Schick et al., 2019). The development of conversational competence during medical school is in line with previous research, which investigates the impact of communication training on the development of communication competence in UME (Aspegren, 1999; Gartmeier et al., 2015; Yedidia et al., 2003) and the predictive validity of the communication competence measured at the beginning of UME related to performance later in UME and GME (Dong et al., 2015).

These studies revealed that medical communication competence can be trained, and that the underlying competencies, particularly empathy, also change during UME. The state of research on empathy as a competency is ambiguous: whereas, Neumann et al. (2011) reported a decline in empathy during UME and GME, Spatoula et al. (2019) indicated a change that depends on the measure.

Taken together, the outcomes of this dissertation contribute, first, to a deeper understanding of assessing medical communication competence considering components of analytic and holistic assessment approaches and, second, to new empirical findings toward an increase in medical communication competence during UME.

6.2 Empirical findings on attitude assessment and attitude changes

The aim of the second study was to contribute to the second research objective of whether and how medical students' attitudes toward behavioral aspects of doctor–patient conversation change during the clinical elective year (Schick et al., 2021). To assess this change in attitudes, Q methodology was applied. Senior medical students were asked to participate three times during the clinical elective year (t_1: at the beginning of the clinical elective year; t_2: after 24 weeks; t_3: at the end of the clinical elective year). The first research question of the second study aimed to investigate which medical students' attitude profiles could be identified at the beginning of the clinical elective year. Three different attitude profiles were revealed at t_1. Attitude Profile 1 seemed to highlight *providing information and fostering shared decision making* as most important for a successful doctor-patient dialogue. Attitude Profile 2 suggested the importance of the *patients' concerns and emotions while meeting their desire for sufficient information*. Attitude Profile 3 seemed to emphasize *the use of appropriate conversation techniques to structure the conversation and gather sufficient information* (Schick et al., 2021). The distinguishing conversational

aspects of the three profiles seemed comparable with the findings reported by Flocke et al. (2002) and Roter et al. (1997), who described different conversation patterns: the "biopsychosocial" physician considers the patients' concerns in the medical interview and focuses on the patient's understanding of illness and treatment plans (Profile #1); the "person-focused" (Flocke et al., 2002), the "psychosocial" (Roter et al., 1997) physician fosters a trustworthy interpersonal relationship to their patients (Profile #2), the "biomedical" (Flocke et al., 2002) or "narrowly biomedical" physician focuses on communicating in an appropriate manner to gather and provide sufficient information (Profile #3).

The aim of the second research question was to investigate the change in attitude profiles during the clinical elective year regarding the content ranking of statements and the migration of participants. Attitude Profile 2 seemed to remain relatively stable during the clinical elective year, referring to both aspects: content and migration. Attitude Profiles 1 and 3 seemed to evolve toward a more patient-centered approach across the three time points during the clinical elective year. Participants in attitude Profile 1 seemed to consider aspects of empathetic behavior as very important at t_1. Profile 1 seemed to increase the importance of considering the patient's perspective during t_2 and t_3. For Profiles 1 and 3, it seemed to be more important for the students to be perceived as empathetic by their patients, as indicated by their ranking of statements about showing empathy higher at the end of the clinical elective year compared to the ranking at the beginning of the clinical elective year (e.g. Statement 7: "My demeanor is appropriate to the nature of the conversations," Schick et al., 2021, p. 10). The attitudinal change of Profile 1 seemed to be in line with the research results by Smith et al. (2017), who emphasized an increase in *taking patients' perspectives* and *emotional contagion* based on the Questionnaire of Cognitive and Affective Empathy (Schick et al., 2021; Smith et al., 2017). Profile 3 also seemed to shift the focus from appropriately structuring the conversation in t_1 to shared decision making and empathetic statements in t_2 and t_3. Regarding the migration of participants between profiles, it seemed that some participants who were in Profile 1 and 3 at t_1 switched between these profiles across the time points. This might be explained by the high correlations between Profiles 1 and 3 and the resulting assumption that these two profiles were more similar to each other than they were to Profile 2.

The results of the second study contribute to research on attitude change in medical communication in general and patient-centered attitudes in particular during UME. The relatively stable importance of shared decision making might be plausible due to the assumption that shared decision making facilitates a patient-centered approach (Charles et al., 1997). However, the research evidence on the attitude change in medical communication is not yet entirely consistent. A decrease in patient-centeredness during medical education has been reported in different studies based on the PPOS (Haidet et al.,

2002; Ishikawa et al., 2018; Tsimtsiou et al., 2007). Junior medical students might have more patient-centered attitudes than senior medical students in UME. Older students might possess more physician-centered attitudes (Haidet et al., 2002). When interpreting the results of these studies, however, it is important to consider that the PPOS is a self-reported measure that results in mean scores of the two scales, “caring” and “sharing” (Krupat et al., 2000). By applying such an approach, an item or attitude with a low value can be compensated for by an item or attitude with a higher value, and vice versa. Thus, information is lost regarding which aspects of patient-centered communication form the attitude profiles of medical students. Notably, the approach presented in this dissertation proceeds one step further by examining which attitudinal aspects of medical communication change during UME.

Profile 2 seemed to remain relatively stable regarding statement weighting and participant distribution. We can surmise that these participants already had relatively strong attitudes compared to those in Profiles 1 and 3. The changes in participants in Profiles 1 and 3 might be due to the learning conditions in the clinical elective year and can be explained by different approaches to attitude change.

The clinical elective year is assumed to be an intensive phase in which medical students can apply their theoretical knowledge to practice and become acquainted with many alternative ways of action and behavior. Many opportunities are presented in the clinical elective year to train medical students’ in communication competence. Multiple patient encounters allow pre-service physicians to (re-)evaluate their behavior in terms of the effectiveness of a certain behavioral approach. If such (re-)evaluation includes new elaborated information and experiences, attitude changes may result (Bohner & Dickel, 2011; Stroebe, 2014).

In addition to their engagement in doctor–patient dialogues, senior medical students should also receive feedback from their supervisors about their medical communication competence and should observe medical interviews conducted by their supervisors. By observing their supervisors in conducting medical interviews, the students could learn from role models. Learning from role models is assumed to facilitate attitude based on heuristic information processing (Stroebe, 2014).

Further, some aspects of medical communication seemed to remain stable during the clinical elective year, whereas some changed. Theories of how behavior influences attitudes propose that a person has to experience a certain situation directly to form a stronger attitude. If the experience is only indirect, the effect on attitude might be weaker (Maio et al., 2019). Furthermore, if the behavior is not in line with the underlying attitude, cognitive dissonance could emerge (Festinger & Carlsmith, 1959). Cognitive dissonance can occur if supervisors expect a behavior that is not in line with the student’s attitudes. The

student has to adjust his or her attitude under the expected behavior to avoid cognitive dissonance (Festinger & Carlsmith, 1959; Maio et al., 2019). Based on these theories about attitude change, the findings of the second study only present assumptions about the reasons for the change in attitudes toward empathetic behavior in medical interviews. Students might ascertain that empathetic behavior supports building a trustworthy working relationship with the patient and that such a working relationship may be conducive to treating the patient in the best possible way.

Applying Q methodology in a longitudinal study represents an innovative approach to measuring attitudes toward medical communication. It enables novel insights into the attitude profiles of senior medical students and their development (S. R. Brown, 1996; Cross, 2005). The present dissertation replicated three different attitude profiles at all three time points with substantial relationships between them. Some existing studies have explored the relationship of attitude profiles with different foci (McHugh et al., 2019), or on the same focus at two time points (Davies & Hodge, 2012). The participants in the study by McHugh et al. (2019) had to sort statements referring to the causes of health inequality in the first round and to solutions to health inequality in the second round. Davies and Hodge (2012) investigated the development of environmental aspects of farmers at two time points by applying Q methodology. The relationship between the perspectives and these aspects was investigated by calculating their correlations (Davies & Hodge, 2012; McHugh et al., 2019). A longitudinal assessment of perspectives using Q methodology could be less reliable because it is almost impossible to sort Q-statements in the same manner several times (Cross, 2005). However, Block (1961) revealed a high test-retest reliability and assumed that a person is able to replicate their perspective at different time points. Therefore, the present dissertation seems to provide a possible approach to examining attitude changes over multiple time points, which might indicate specific changes over time.

6.3 Suggestions for practice

The findings of the present dissertation could provide some implications for facilitating medical communication training in UME. Nowadays, medical communication competence is fostered in different learning settings, such as seminars about medical communication, simulation-based medical communication training with standardized patients, or included in ward round trainings like bedside teaching (Kurtz et al., 2016; Schultz et al., 2018). Although these learning settings already include feedback from the medical teacher, peer, and standardized patients, applying the KCSAFd can also stimulate medical students' self-reflection and support structured feedback by medical teachers, standardized patients and peers (Calhoun et al., 2010). The different perspectives can be

compared to elaborate on different aspects that allow for a more holistic picture of medical students' communication competence (Calhoun et al., 2009; Rotthoff et al., 2021).

In addition to assessing medical communication competence via rating scales (Schick et al., 2019), Q methodology can also be applied to examine learning outcomes, for example, of medical communication training (Balloo et al., 2016; Márquez-Álvarez et al., 2021). Medical communication training itself can be further facilitated by applying Q methodology. Sorting statements about behavioral issues of medical communication could be assumed to foster the reflective abilities of medical students. Medical students can pay attention to their attitudes toward medical communication or other aspects of the medical profession, such as professional identity formation or dealing with dying and death. Constructing visible profiles of attitudes by applying Q methodology could provide an opportunity for medical students to detect less promising attitudes and to re-evaluate such attitudes to increase their understanding of some aspect of their behavior in medical interviews or other professional behavior schemes.

However, further work and research are still necessary for the effective application of Q methodology in the context of medical communication training in UME. In the next section, suggestions for further research and the limitations of the dissertation are outlined.

6.4 Limitations and further research

Some limitations should be considered when interpreting the results of the present dissertation. First, the present dissertation does not provide inferences about the relationship between the medical communication competence assessed with the KCSAFd and the attitude profiles of the participants. Further research could investigate how to relate attitude profiles to medical students' behavior in medical interviews. Such studies could examine whether attitude profiles predict performance in medical interviews (and vice versa).

Second, only two medical educational levels were considered in the study reported in Journal Article A (Schick et al., 2019). No conclusion can be drawn about which components of medical education, between the first year and the final year, foster the development of medical communication competence. Future research could consider different process variables in a longitudinal study, such as the number of clerkships, the quality of the learning conditions during the clerkships, or whether students received feedback during the clerkship, and the quality of this feedback to find possible predictors that facilitate the development of medical communication competence.

Third, until now, the KCSAF has been applied only for formative assessments (Calhoun et al., 2010; Peterson et al., 2014). Since the present dissertation assumes that the

measure differentiates between educational levels in a formative assessment, further research could investigate the suitability of the instrument for summative assessment. For a summative assessment, a threshold at which a person is “sufficiently” competent and could pass the assessment might need to be defined (Blömeke et al., 2015).

Fourth, the medical students received valued incentives to participate in the validation study of the KCSAFd (Study A/ Journal article A) and in the Q-study (Study B/ Journal article B). The senior medical students in study A participated in the ÄKHOM study and received a priceless two-day trip to Hamburg with an overnight stay and a 25 EUR book voucher. The medical students who participated in the Q-study received a 105 EUR book voucher if they had participated at all three measurement points. Hence, it could be precluded that the participant students differed in motivation and interest in medical education from the non-participants. The students who attended the Medical Interview 1 workshop in the first clinical year participated voluntarily, but since the data collection took place during the course, there were very few students who refused to participate. Thus, it can be assumed that the sample represents the current learning level of the cohort.

Fifth, the present dissertation investigated only the attitude profiles of senior medical students. No assumption could be inferred as to which attitude profile is the most promising or how much more different the senior medical students are from experts or senior physicians. Future research could consider attitude profiles from different levels of medical careers. In particular, the attitude profiles of senior physicians could provide information on how attitude profiles change across physician generations (Bude, 2010), which (workplace) conditions cause such change, and the degree to which such attitude profiles could influence the doctor–patient relationship.

Finally, when measuring attitudes, researchers should be aware that when people are asked to share their attitudes, they consider readily available information and integrate that information into an overall judgment of attitude. Only a few people are able to recall global attitude evaluations from memory; others create their attitude evaluations only when asked to do so. (Fabrigar et al., 2019). Thus, it cannot be precluded that attitudes became conscious for the first time through mere confrontation with attitudes through the Q method.

6.5 Conclusion

The present dissertation suggests important findings regarding the assessment and change of medical communication competence and attitudes toward medical communication in UME. Medical communication competence plays a pivotal role in the medical profession, especially in patient encounters. Since much effort is dedicated to fostering medical communication competence in simulation-based training, research on

changes in medical communication competence and attitude is scarce. The present dissertation revealed new empirical insights into the analysis and changes in medical communication competence and attitudes toward medical communication. The change was investigated through the performance of medical students in simulated medical interviews in the first and final clinical year of UME and on attitude profiles of medical students toward medical communication during the clinical elective year. In this dissertation, we assume that medical communication competence increases during UME. In particular, conversational competencies seemed to increase over time, whereas interpersonal competencies remained stable. A deeper insight into the change in attitudes toward medical communication seemed to highlight which aspects of empathy and medical communication increased or decreased. The study of attitude change during the clinical elective year suggested how individual aspects of attitudes toward medical communication change. The attitude profiles seemed to change toward patient-centered perspectives. Whereas shared decision making seemed to be of high importance across the profiles and the clinical elective year, especially the change of building a trustworthy interpersonal relationship is of interest here: Profile 2 seemed to attribute high importance at t_1 to statements about interpersonal aspects of conducting medical interviews. In Profiles 1 and 3, there seemed to be an increase in the importance of aspects demonstrating empathy during the clinical elective year. Profile 1 also seemed to emphasize considering the patient's perspective as more important across the clinical elective year. By contrast, Profile 3 suggested a decrease in importance in considering patients' perspectives.

Together, the findings of the present dissertation suggest a holistic perspective on the assessment of change in medical communication competence and seem to present deeper insight into the hidden structure of attitudes toward medical communication.

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Appendix

Appendix A

Schick, K., Berberat, P.O., Kadmon, M., Harendza S., & Gartmeier, M. (2019). German language adaption of the Kalamazoo communication skills assessment form (KCSAF): A multi-method study of two cohorts of medical students. *Zeitschrift für pädagogische Psychologie,* 33(2), 135-147. https://doi.org/10.1024/1010-0652/a000241.

Appendix B

Schick, K., Gartmeier, M., & Berberat, P. O. (2021). Senior medical student attitudes towards patient communication and their development across the clinical elective year – A Q-methodology study. *Frontline Learning Research*, *9*(1), 1–29. https://doi.org/10.14786/flr.v9i1.583.

Appendix C

German adaptation of the Kalamazoo Communication Skills Assessment form:

- KCSAFd-self – Rating scale for students' self-appraisal
- KCSAFd-sPat – Rating scale for standardized patient's perspective
- KCSAFd-video – Rating scale for external video rating by trained raters

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