UiT The Arctic University of Norway

Faculty of Health Sciences

Group-based mentoring in undergraduate medical education

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2 English summary

This thesis focuses on group mentorship for undergraduate medical students as a pivotal element in fostering a supportive and collaborative learning environment, essential for the complex field of medicine. Previous studies have mostly focused on one-on-one mentoring. Group mentorships can foster a collaborative and reflective environment in which students can benefit from the collective knowledge and experiences of their peers and mentors. In Paper I, a systematic review was conducted to identify group mentorships for medical students. Based on the findings, we provide insights for structuring and assessing such mentorships. We highlight the benefits of making such programs compulsory, longitudinal, and integrated with the curriculum, along with mentor support and frequent evaluations. Paper II explores group mentors' perceptions at three universities in Norway and Canada, specifically what factors influence their level of satisfaction. The main results were that physician mentors' overall satisfaction is closely linked to them experiencing fulfilling mentor–student relationships and personal and professional development. Paper III investigates the UiT medical students' experiences and attitudes by comparing the first class of students with a longitudinal mentorship program and the final class of students in the old curriculum without such a program. The findings suggest that a longitudinal group-based mentorship program can make students feel better prepared for clinical practice and help them develop positive attitudes toward important professional attributes such as patient-centeredness. In conclusion, the findings from the three papers emphasize the significant potential of group mentoring programs in medical education. Investigating group mentorship is essential not only for understanding its immediate impact on students' academic and professional growth but also for its potential implications on the culture of medical education and practice.

3 Norwegian summary

Gruppementorering kan være et viktig element for å fremme et støttende læringsmiljø for legestudenter, i tillegg til å understøtte utvikling av en profesjonell identitet og forberede dem på overgangen mellom student- og legerollen. Historisk sett har individuell mentorering vært vanlig i medisinsk utdanning, men i de siste årene har gruppebaserte ordninger blitt mer prevalent. Gruppementorering kan skape et reflekterende og trygt miljø hvor studentene kan dra nytte av kollektiv kunnskap og erfaringsutveksling både fra sine medstudenter og mentorer. I artikkel I gjorde vi en systematisk litteraturgjennomgang for å utforske hva som finnes av slike ordninger i verden. Basert på funnene gir vi forslag til hvordan slike programmer kan struktureres samtidig som vi belyser fordelene ved å gjøre disse programmene obligatoriske, langsgående og integrerte i studieplanen. Artikkel II undersøker erfaringene til gruppementorer ved tre universiteter; UiT Norges arktiske universitet, Universitetet i Bergen og McGill University i Canada, og spesifikt hvilke faktorer som påvirker mentortilfredshet. Generell tilfredshet viste seg å være nært knyttet til det å ha givende relasjoner med studentene samt å oppleve personlig og profesjonell utvikling i mentorrollen. I artikkel III sammenlignet vi medisinstudenter ved UiT før og etter implementering av gruppementorering. Resultatene tydet på at et langsgående, gruppebasert mentorprogram kan bidra til at studenter føler seg bedre forberedt til klinisk praksis samt understøtte utviklingen av positive holdninger mot pasientsentrert kommunikasjon og etiske refleksjoner. Funnene fra de tre artiklene viste et betydelig potensial ved gruppementorprogrammer i medisinsk utdanning. Det er essensielt å sikre kvaliteten på slike programmer ved å innlemme dette i studieplanen samt sørge for kompetanseheving for mentorer slik at de opplever at de mestrer og trives i rollen. Ved å understreke betydningen av og videreutvikle mentorordninger i legeutdanningen kan vi fremme en kultur for mentorering som forbedrer medisinsk praksis og hvor pasienten er satt i fokus blant fremtidens leger.

4 Abbreviations

PROFKOM	Profesjonell Kompetanse/Professional Competence
UiT	UiT The Arctic University of Norway
UiB	University of Bergen
UiO	University of Oslo
SCOPME	Standing Committee on Postgraduate Medical and Dental Education
LCME	Liaison Committee on Medical Education
AAMC	American Association of American Medical Colleges
UNN	University Hospital of North-Norway
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PICO	Population, Intervention, Comparison, Outcome
MERSQI	Medical Education Research Study Quality Instrument
KMO	Kaiser–Meyer–Olkin
ICC	Intraclass Correlation Coefficient
DEFF	Design Effect
VIF	Variance Inflation Factor
CSAS	Communication Skills Attitudes Scale
NC-students	New Curriculum students
OC-students	Old curriculum students
REC	Regional Committees for Medical and Health Research Ethics
PROSPERO	Prospective Registry of Systematic Reviews

5 List of papers

This thesis is based on the following papers, which will be referred to in this thesis as Paper I, Paper II, and Paper III.

I. Group mentorship for undergraduate medical students – a systematic review.
Published in Perspect Med Educ 2020 Oct;9(5):272-280.

II. What makes mentors thrive? An exploratory study of their satisfaction in undergraduate medical education
Published in BMC Med Educ 2024 Apr 4;24(1):372.

III. Attitudes of medical students towards communication skills and patient-centered care: the impact of group mentorship
Submitted for publication to International Journal of Medical Education

6 Foreword

"From the earliest times, medicine has been a curious blend of superstition, empiricism, and that kind of sagacious observation which is the stuff out of which ultimately science is made. Of these three strands – superstition, empiricism and observation, medicine was constituted in the days of the priest-physicians of Egypt and Babylonia; of the same three strands it is still composed. The proportions have, however, varied significantly; an increasing alert and determined effort, running through the ages, has endeavoured to expel superstition, to narrow the range of empiricism, and to enlarge, refine and systematize the scope of observation."

Abraham Flexner

"Let us emancipate the student and give him time and opportunity for the cultivation of his mind, so that in his pupilage he shall not be a puppet in the hands of others, but rather a self-relying and reflecting being." Sir William Osler

"Professionalism is medicine's most precious commodity."

Richard Horton

"I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel." Maya Angelou

7 Background of this thesis

When I was a little girl, I used to imagine that my bedroom was a hospital for teddy bears. I would talk to them and try to comfort them while fixing their broken legs and other ailments. I also visualized myself flying a F16 Fighting Falcon. As I grew older, it became clear to me that my biggest dream was to become a doctor (although I still want to fly airplanes). One of my main inspirations was Dr. Ørjan Eggesvik, the surgeon who operated on my ears numerous times due to bilateral cholesteatoma. Over several years as a patient, I have come to understand how crucial the patient–physician relationship is. Through his tranquility and respectful demeanor, Dr. Eggesvik illustrated the kind of doctor I wanted to become.

During the first year of medical school in Tromsø, we got assigned to mentorship groups as part of the professionalism program named "PROFKOM". I felt that the learning outcomes from these group meetings were sparse, and I was eager to learn more. One of many things that I have learned from my father is that one can always strive for improvement. In my third year of medical school, I met Dr. Eirik Hugaas Ofstad in an inspiring lecture he gave on medical decision-making and communication with patients. I approached him directly afterward to express my interest in patient–physician communication and mentorship in medicine. I had applied for the MD PhD program for medical students a few weeks prior to this. Luckily, I was admitted to the MD PhD program, and Eirik and his colleagues invited me to join some newly initiated research projects. New friendships and research collaborations were burgeoning.

The first project I got involved in, named the "CanNorMent study," aimed to identify and comprehend the factors that contribute to well-functioning longitudinal group mentorships for medical students. It was a collaborative study between researchers at UiT The Arctic University of Norway (UiT), the University of Bergen (UiB), and McGill University in

Montreal, Canada. We recognized that there was a lack of knowledge in such group-based programs, especially with respect to how such mentorships in medicine are organized and evaluated. Therefore, as a first paper for my PhD, we conducted a systematic review with the aim of identifying group-based mentorship programs for undergraduate medical students and describing aims, structures, contents, and evaluations. The findings resulted in recommendations for the organization and assessment of such programs.

When I was admitted to the MD PhD program, the CanNorMent survey had already been distributed to mentors at the three universities. Hence, I participated in the qualitative part of the research, in which I interviewed the mentors and transcribed the interviews, afterward. I was initially supposed to collaborate with another research student in Bergen. Unfortunately, after a while, I ended up being the only student involved. The original idea was that my PhD would comprise papers based on both qualitative and quantitative data from the CanNorMent study, i.e. the Norwegian and Canadian mentors. I was involved in the qualitative part of the study by interviewing mentors at the University of Bergen and transcribing about half of the interviews. We changed this plan due to various circumstances, resulting in Paper II being based solely on the quantitative data that were collected from mentors at the three universities.

The second project, which became the topic of Paper III, was initially led by Dr. Tor Anvik and consisted of self-reported data from medical students at UiT. In 2019, Eirik and I had a meeting with Tor, in which he shared his impressive work evaluating the medical curriculum and the group mentorship program at UiT. The evaluation also included questions on students' attitudes toward learning communication skills and patient-centeredness. Tor expressed his wish for someone to continue his work as he was on the edge of retirement. I felt privileged to have the opportunity to delve into this (in my view) vital aspect of educating future physicians. With the CanNorMent data and the data from the UiT medical students, we

could explore group mentorships from both mentors' and mentees' perspectives. From August 2017 to December 2020, I was part of the MD PhD program for medical students. After my graduation in 2021, I was lucky to get the opportunity to be a mentor for fifth- and sixth-year medical students located in Bodø. I was a full-time PhD student at UiT The Arctic University of Norway from April 2023 until March 2024. Now, I have started working as a doctor (LIS1) at the Nordland Hospital Trust.

8 Introduction

8.1 A brief history of medical education

One of the earliest statements on the student–teacher relationship in the literature of medicine originates from Charaka, who was depicted as a great physician and teacher in Sanskrit medical literature. In the *Ayurveda,* he argued that men who wanted to study medicine should find a good teacher:

"[one whose] precepts are sound, whose practical skill is widely approved, who is clever, dexterous, upright, and blameless; one who knows also how to use his hands, has the requisite instruments and all his senses about him, is confident with simple cases and sure of his treatment in those which are difficult; of genuine learning, unaffected, not morose or passionate, and who is likewise patient and kind to his pupils" (1).

The formal system of medical education in Europe was initiated in the late Middle Ages. Founded in year 1220, the University of Montpellier in France is one of the oldest medical school in the world and is still operating (2). Perhaps the most famous school was the Salerno in southern Italy (unusually, women were allowed to study there) (3). At the time, medicine was strongly rooted in the Greek tradition, in which Hippocrates (also known as "the father of medicine") proposed that the human body was composed of the four humors: yellow bile, black bile, blood, and phlegm. The learning approaches were quite similar to apprenticeships – students learned practical skills and the use of medicinal plants from more senior peers (4).

During the period from 1100 until the mid-1850s, medical practitioners were divided into two separate groups: 1) practical trained surgeons, who were supervised by "master surgeons"; and 2) academic doctors, whose training was completely theoretical (5). The first "modern" medical schools were established during the 18th and 19th centuries. In 1910, Abraham

Flexner published a report that in many ways revolutionized medical education (1, 6). He visited all 155 institutions for medical education in the United States and Canada. Most of these were viewed by him as being non-functional, such that students received little exposure to clinical training and the standards regarding admissions requirements and graduation were generally low. At the time, the education of physicians had minimal regulations and anyone who wanted could use the title "doctor." The so-called "Flexnerian report" led to a major reduction in the number of proprietary medical schools in the United States and emphasized the importance of scientific knowledge in medical education (1, 7). Flexner also emphasized the importance of bedside teaching and advocated that medical students should interact with patients, observe physical examinations, and learn from experienced clinicians at the bedside (8).

As a supplement to the aforementioned report, in 1912, Flexner published a similar report on medical schools in Germany, Austria, England, Scotland and France (9). While recognizing that several of the European schools had highly competent faculty and well-developed clinical training, he highlighted the need for curricular improvements. Similarly to the findings in the United States and Canada, some of the European medical schools varied greatly regarding teaching quality, infrastructure, and faculty resources. Furthermore, some institutions were more attentive to profit than to providing high-quality education. This report resulted in many European medical schools implementing more clinical training and stricter regulations to ensure the quality of their curricula (8).

In 1814, the first medical school was established in Norway, in Christiania (now Oslo). This marked an important milestone, as Norway was the first country in Europe to implement a medical curriculum that did not differentiate between educating surgeons and academic doctors (10). Norway's first professor of medicine, Michael Skjelderup (1769–1852), had received his training at the Royal Academy of Surgeons in Copenhagen and was a professor

at the University of Copenhagen. Norway was under Swedish rule at the time, and all travel between Norway and Denmark had to take place through Sweden, with Norwegians being required to pledge loyalty to the Swedish king. Skjelderup's journey to Norway was perilous, as his ship was fired upon by a Swedish frigate (11).

For almost 150 years, the University of Oslo (UiO) was the sole institution offering medical education in Norway. The University of Bergen founded its medical education program in 1946, followed by Trondheim in 1975. Two years before Trondheim, the University of Tromsø (now UiT The Arctic University of Norway) established its medical curriculum, which was considered the most advanced in Norway at the time. The curriculum in Tromsø emphasized early patient contact in local hospitals and medical clinics, close monitoring of student progress, and high-quality lectures. Furthermore, it placed a strong emphasis on preparing students to serve as doctors in northern Norway, considering the unique societal context in that region (12). I will discuss the medical education at UiT in more detail in Chapter 8.5.1.

8.2 What is mentoring?

8.2.1 The history of mentoring

The phenomenon of mentoring has its genesis in Greek mythology (13). According to Homer's epic, Mentor was in charge of Odysseus's son Telemachus when Odysseus participated in the Trojan War. Athena, the Greek goddess of wisdom, takes the form of Mentor at several points in the story to offer guidance to Telemachus. Odysseus is gone for over twenty years. During this period, Mentor is responsible for Telemachus' education and the development of his character and wisdom. When Telemachus leaves to search for his father, Mentor comes with him. Mentor is described as playing a vital role in Telemachus' maturation: "Mentor was the transition figure in Telemachus' life during the journey from

youth to manhood." He is depicted as a caring and reliable person who shares his knowledge and supports others in their search for knowledge. Hence, the word "mentor" came to be associated with somebody who offers advice or guides a protégé in the attainment of a certain skill (14).

From the 1970s until the 1990s, mentoring was increasingly established within three fields: psychology, management and education (15, 16). In 1977, Rosabeth Kanter at Harvard Business School published *Men and Women of the Corporation*, which delineates the association between having a mentor and accomplishing success in business (17). The link between having a mentor and achieving success was further emphasized in a survey of over 1,000 eminent business leaders at Harvard in 1979. The authors of the survey found that directors who had a sponsor or mentor had higher levels of education, earned more money at a younger age and were more likely to have a specific career plan. The mentors were typically senior businessmen in positions of authority. Furthermore, the mentor–mentee relationships often evolved into long-lasting friendships, which then inspired young directors to become mentors themselves (18).

Within the field of psychology, the book *Seasons of a Man's Life* was published in 1978, emphasizing the role of mentoring in development psychology. The author argues that the mentoring relationship is highly dependent on the mentor, who is more experienced than the mentee, successfully balancing the roles of advisor, teacher and role model (19). In the years following this book's publication, several studies highlighted how mentor–student relationships may influence students' learning outcomes (20, 21). These initial endeavors laid the groundwork for substantial contributions to the mentoring literature. If you conduct a literature search in PubMed with "mentor" as a keyword, it shows an exponential rise in attention to the subject. The number of publications from 1900 until 1970 was 8, and from

1970 to 1990, the number was 365. In contrast, between 1990 until 2023, a total of 30,328 manuscripts on mentoring are listed in PubMed.

8.2.2 Definitions

Numerous definitions of mentoring can be found in the literature, making it challenging to distinguish mentoring from other types of interpersonal relationships and to compare its outcomes (15, 22). According to the *Oxford English Dictionary*, the word "mentor" can be used as a noun, defined as "an experienced and trusted adviser to another person, especially a person who is younger and less experienced," or as a verb, with the following definition: "to advice or train". A review published in 1991 found a total of 15 definitions of mentoring, including *"Derived from Greek mythology, the name implies a relationship between a young adult and an older, more experienced adult that helps the younger individual learn to navigate in the adult world and the world of work. A mentor supports, guides, and counsels the young adult as he or she accomplishes this important task"* and *"Mentors are influential people who significantly help you reach your major life goals"* (15). In a review of the literature published between 1990 and 2007, more than 50 different definitions for mentoring were discovered (23).

In a Standing Committee on Postgraduate Medical and Dental Education (SCOPME) report in 1998, mentoring is defined as *"A process whereby an experienced, highly regarded, empathetic person (the mentor) guides another (usually younger) individual (the mentee) in the development and re-examination of their own ideas, learning, and personal and professional development"* (24). We have used this definition in our research, as it is both frequently used in the medical literature and well-aligned with our study context.

Although there are no universally accepted definition of mentoring, a literature review from 1991 proposed five common elements of the mentoring concept, which may be just as applicable today (15):

- The mentor should provide support to the mentee to help them succeed, and mentors should focus on broader goals rather than specific tasks.
- Mentoring should include psychological support, career and professional development, and role modeling.
- Mentoring relationships should be reciprocal, with both the mentor and mentee gaining benefits.
- Mentoring relationships need direct interaction between the mentor and mentee.
- Mentors should have greater experience and achievement than their mentees.

Some associate mentors with sponsors, coaches or advisors, but they are not identical. A sponsor is often a person that uses their own resources to influence the path of the trainee's career. A coach's aim is often to help a person improve or develop a certain skill, or to integrate them into a group to achieve a shared goal. An advisor is often a faculty member who provides guidance on applications and managing elective rotations (25). Mentoring should also be distinguished from supervising, which commonly focus on teaching specific skills (26).

However, it is possible to think that mentors are fulfilling all these roles at the same time. As an advisor, the mentor can impart professional values (22). As a sponsor, the mentor may provide opportunities for the mentee by introducing them to different networks, e.g. specific medical fields (27). As a coach, the mentor helps the mentee develop specific skills or goals (22). Altogether, a mentor aims to support the mentee in achieving a wide array of goals, such as academic development, personal development, and practical skills, as well as providing emotional support (28). Mentoring allows a two-way (or multilateral) relationship to a greater

extent than a coach or advisor relationship, in which the emphasis is on guiding or assisting the mentee (29).

8.2.3 Mentoring in medical education

Sir William Osler (1849–1918) was a prominent physician and educator who exerted a major impact on medical education by highlighting the significance of bedside clinical teaching and mentoring (30). He strongly encouraged students to exercise critical thinking and professional values by actively engaging with their patients and learning from more experienced colleagues. In 1889, he implemented a structured postgraduate training program at the Johns Hopkins Hospital in Baltimore, USA. In this program, which developed into the modern residency system, the young medical graduates had the opportunity to work close to experienced physicians, in a mentor–student relationship. Osler emphasized the importance of compassion and empathy in medicine and taught that mentors should not only impart medical knowledge but also teach professional values to their mentees such as compassion and ethical thinking (30, 31). Today, many medical schools have adopted Osler's principles by establishing mentorship programs. At McGill University in Montreal, mentors are named "Osler Fellows" in honor of him (32).

Formal mentorship programs in medical education were introduced around the 1990s (33). Medical education and the medical profession have traditionally been strongly embedded in biomedical knowledge. Previously, it was supposed that professionalism would be transmitted implicitly by role modelling within the curriculum (31). This may well have been the case in earlier times when there was a lower number of students, thus allowing more intimate student–teacher relationships. An increasing number of students, a shortage of human and financial resources, and greater complexity in medical education may be experienced as a threat to the learning of professional values (31). In Norway, there were a total of

approximately 3,200 medical students in 2019, and the number is rising (34). The annual number of medical students at UiT has increased by 350%, from 40 in 1973 to 180 in 2023.

There has been a growing recognition of the need to emphasize students' humanistic and psychosocial qualities in the medical curriculum, along with teaching them professional conduct. This need can be met by implementing mentorship programs for medical students (35). In the United States, the Liaison Committee on Medical Education (LCME) obliges medical schools to offer programs to facilitate students' adjustments to the psychosocial demands of medical school and to promote their well-being (36). As a result, an increasing number of medical schools have established mentorship programs (37).

Medical school is difficult, and many students face several stressors and adverse influences in their learning environment (38, 39). Such impacts have been found to have negative consequences for their professional identity formation and to cause a decline in empathy and patient-centered attitudes (40-42). In a narrative literature review published in 2016, the results consistently showed that a large percentage of both medical students and residents have symptoms of severe burnout, characterized by emotional exhaustion, depersonalization (i.e. feeling detached from or callous toward patients) and a low sense of personal accomplishment (43).

Measures such as mentorship programs, intended to alleviate these influences on students' development, seem to be required. Longitudinal mentoring has been shown to improve psychosocial skills and humanistic attitudes (44). In a recent study of 2,800 physical therapists in the United States, respondents who had a formal mentor displayed significantly fewer symptoms of burnout than those not receiving mentoring (45). In addition to professional identity formation, several other aims of mentorships for undergraduate medical students exist, such as offering career advice, supporting underrepresented minorities in

medicine, and fostering interest in research and diverse medical specialties (33). These aims are briefly discussed in Chapter 8.2.5.

8.2.4 Mentoring approaches – who and how

Mentoring in health professions education can exist in several formats, such as one-on-one, in groups of varying sizes or in virtual platforms. Mentoring can be formal or informal; it can be created intentionally or arise serendipitously (46). A United States study from 2014 on how 14 new medical schools structured their mentorship programs revealed that there was little uniformity among mentoring programs at new medical schools in the way they were organized (29), a finding also reached by other studies (28, 33). The mentoring format can be customized to meet the individual or institution's goals and the resources available (47).

One can find almost countless desirable features of a mentor in the medical literature, mostly in relation to one-on-one mentorships (22, 33, 48-50). In general, being student-centered and demonstrating a commitment to personal and professional growth seem to be particularly highly valued qualities in mentors (22, 48). A competent mentor is often described by mentees as being enthusiastic, knowledgeable and compassionate (48, 51). Nevertheless, some have argued that a mentoring relationship does not require any specific idealized attributes; instead, mentors should have an open-minded attitude, a strong commitment, and a willingness to maintain the mentoring relationship in a longitudinal perspective (52). Mentors of medical students may have a variety of backgrounds and professional roles within healthcare institutions and academia. In Table 1, I present an overview of who serves as mentors for medical students.

Table 1 An overview of who serves as mentors for medical students

Faculty mentors	Faculty mentors are faculty members, i.e. educators working in universities, who serve as mentors. Faculty mentoring is the most common format for both one-on-one mentoring and group-based mentorships in medical education (33). Some programs offer a "tiered" model in which the mentors comprise a combination of faculty members and senior medical students or residents (37).
Clinical mentors	This term typically refers to physicians or healthcare professionals who act as mentors, facilitating clinical skills training and bedside teaching during clinical rotations (28). Various clinical mentoring programs have been developed to prepare senior medical students for their future roles as junior physicians (53, 54). Physicians in the early stages of their careers, such as residents, may relate better to students, as they have recent experiences of the transition from being a student to becoming a doctor (55).
Specialty mentors	Physicians or healthcare professionals specializing in specific medical fields can mentor medical students interested in those specialties or research fields (28). This format is especially prevalent in medical schools in the United States (56).
Peer mentors	Peer mentoring involves matching students who are at similar stages of training or experience, while near-peer mentoring refers to senior medical students mentoring students at a lower level (28).

8.2.4.1 Informal and formal mentoring

Before I introduce you to the different mentoring approaches, it seems reasonable to explain what differentiates informal from formal mentoring. Informal mentoring (i.e. mentoring that occurs spontaneously) is often initiated by one or more mentees, and the aims and outcomes of the mentoring affiliations are typically undetermined. The relationship between the mentee and mentor is flexible, unlike formal mentoring, which has a structure and is embedded

within the medical curriculum (46). In medicine, mentoring relationships have largely been informal because of the flexibility that has allowed students and residents to develop mentoring relationships with senior physicians, thereby gaining skills and knowledge (57). Both formats have their inherent challenges – informal mentoring is less structured and may be difficult to pursue for introverted individuals, resulting in social exclusion. On the other hand, formal mentoring may be more challenging to establish and maintain because it requires a selection and training process, formal agreements, a clear set of rules, and funding (22, 46). In this thesis, I will focus on formal mentoring. Other formats do exist (47), but these are outside the scope of this thesis and hence not mentioned here.

8.2.4.2 Group-based mentoring

Group-based mentoring allows one or more mentors to work with a group of students (47). It allows for peer interaction, shared learning experiences and the development of a supportive community. I will elaborate on group-based mentorships in Chapter 8.4.

8.2.4.3 One-on-one mentoring ("dyad")

The "dyad" relationship is the classic one-on-one relationship between a senior mentor and a junior mentee and has traditionally been the most common form of mentoring in medical education (33, 56). However, a recent review found that group mentorships were considerably more common in Europe and Middle Eastern medical schools than in the United States (56). One-on-one mentoring allows for personalized feedback and the development of a close mentor–mentee relationship (29, 58).

8.2.4.4 Peer or near-peer mentoring

This approach is widely used to teach specific features of the curriculum, e.g. procedural skills (28). Student mentors may relate better to mentees' experiences than more senior

mentors, as they are closer to students in training than more experienced physicians (28). It has been shown that higher levels of student engagement, e.g. students taking the role of mentor, lead to a greater sense of belonging to institutions, a greater sense of responsibility and more satisfying learning experiences (59).

8.2.4.5 Virtual mentoring (e-mentoring)

Virtual mentoring is a relatively recent format that uses Skype, FaceTime, and other virtual meeting facilities. There has been a particularly growing need for such platforms since the COVID-19 pandemic, during which several countries imposed public health measures such as quarantines (60). This mentoring format is more geographically accessible, although there is a risk of miscommunications, and it may take more time to develop well-functioning mentoring relationships (47).

8.2.5 Mentorship aims

In 1983, a study of the mentoring of young managers revealed two primary aims of mentoring: 1) providing career or instrumental support that includes skill development and 2) offering role modeling and psychosocial support (61). These aims are particularly frequent in mentoring relationships in undergraduate medical education. Frei et al. have recognized four general aims of mentorships for medical students in the United States: developing professionalism and personal growth, offering career advice, recruiting students to certain specialties and fomenting interest in research and academic careers (33). Similar program goals can also be found in established mentorship programs outside the United States (58, 62).

According to a recent review of mentoring in medical education, almost half of the reviewed mentorships in the United States aimed to expose students to specific fields of medicine and particular surgical specialties, whereas students' professional development, emotional well-

being, and psychological support were more frequent aims of mentorships outside the United States, i.e. in Europe and the Middle East (56). In contrast, only one out of 19 programs in the United States mentioned this as the aim of its mentorship program (56). In a survey of medical students in Germany, 95% said that surgical mentorship programs could have a positive impact on their career pathways as surgeons (63). Additionally, several other medical specialties, including primary care and obstetrics/gynecology, have utilized mentorship programs to support student interest in those fields (64, 65).

There are also mentorships that aim to encourage applications to medical school by underrepresented groups (28). The Association of American Medical Colleges (AAMC) definition of underrepresented in medicine is as follows: "Underrepresented in medicine means those racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population" (66). For example, women remain underrepresented in academia, particularly at the highest levels (67). Globally, few women reach leadership or senior positions within higher education, and the number of females tends to decline progressively at increasing levels of academia (68).

Nearly 90% of reviewed mentorship programs outside the United States were aimed at developing students' professional identities (56). This description characterizes the group mentorships at UiT, UiB and McGill University, where the main aim is to provide a safe environment for the reflection and sharing of experiences among peers and mentors, to guide and support students through their transition to being a physician, and to help students become patient-centered. More details on professional identity development, professionalism, and patient-centeredness will be presented in Chapter 8.3.

8.2.6 Potential challenges to mentoring

A huge number of studies, primarily on one-on-one mentorships, have reported positive outcomes of mentorships. Benefits for students include enhanced personal support (69-71), professional development and enhanced satisfaction with their medical schools (37, 69, 72-75). Mentors have also reported several benefits, including enhanced personal development (76, 77) and improvements in clinical skills such as listening and communication (73). However, despite the extensive knowledge of its potential advantages, there are some challenges and barriers that may affect both students and mentors. One of these challenges stems from the fact that mentors are typically clinician–educators who may not have received sufficient training in their mentorship role (28). This can limit their ability and self-confidence to provide appropriate guidance and support to mentees, potentially diminishing the overall impact of the mentor–mentee relationship (78).

The importance of establishing clear expectations for mentors has been emphasized, along with that of equipping them with the necessary tools to develop essential feedback and listening skills (78, 79). Geraci et al. have highlighted the need for mentor preparation in which mentors *"engage in self-reflection and assessment to determine if in fact they have the attitudes, personal qualities, knowledge and skills and can regularly demonstrate the behaviours that are needed to maximize protégé success"* (22).

Another challenge for both mentors and students may be time constraints and competing commitments. Balancing their clinical and teaching obligations and mentoring duties can be difficult, potentially leading to less frequent and lower-quality mentoring (28, 74). Similarly, the medical school faculty may face challenges in incorporating time for mentoring within an already busy curriculum. Medical students often have demanding schedules with heavy academic workloads and clinical responsibilities. If mentorship is not mandatory, dedicating

time for regular mentorship meetings can be challenging, thus leading to infrequent meetings (33). Moreover, group-based mentorships require coordination and scheduling to accommodate the availability of both mentors and students. Time constraints can make it challenging to find suitable meeting times for everyone involved.

Many students face difficulties in finding a mentor if mentoring is not integrated into the curriculum (28). A literature review of all publications evaluating the effect of mentoring on specialty choices and academic advancement among medical students and physicians until 2006 found that less than 50% of medical students had a mentor (77). Furthermore, students may face difficulties in establishing a trusting and open relationship with their mentors. Factors such as differences in age, gender, or cultural background can create barriers to effective communication and can sometimes engender conflict, hindering the development of a strong mentorship bond (80).

8.3 Professionalism and professional identity development

As this thesis is about group mentorships focusing on students' professional development, a brief description of professionalism and professional identity development is appropriate.

Becoming a good doctor takes more than clinical skills and medical knowledge. Medical students need to show professional conduct and gain efficient communication skills. In a review by Birden et al. (81), the authors attempted to provide a comprehensive definition of medical professionalism. They reviewed a range of definitions, one of which identified professionalism as *"a state of mind that includes confidence, motivation and a sense of professional identity"*. The review concluded that there is no universally accepted conceptual framework nor definition of medical professionalism (81). The group mentorships at UiT, UiB and McGill University have adopted the definition developed by the Royal College of

Physicians in London, where professionalism is defined as a *"set of values, behaviours and relationships that underpins the trust that the public has in doctors*" (82).

Professional identity has been described as *"the integration of the professional self and the personal self,"* a description that presents a link between personal identity formation and ones' self-identity (83). Similarly, professional identity formation can be defined as the process of integrating one's self-identity into the professional character of a specific community of practice, resulting in the development of a "fully integrated moral self" (84). Hodges et al. have defined professional identity formation as the acquisition of the competence, attitudes, and knowledge necessary to handle individual work- or study-related conflicts within institutional, interpersonal, or intrapersonal contexts (85). While professionalism and professional identity formation are distinct concepts, they have a significant mutual influence (86). Both are key aspects of medical care and are often seen as lifelong processes (87, 88). Some argue that professionalism and professional development are synonyms, as they are used nearly interchangeably in the literature (81).

As with the definition of professionalism, there is no universal consensus on the best method of teaching medical professionalism (89). An extensive scoping review in 2013 revealed that role modeling and mentoring appear to be the most important teaching methods for medical students' professional development (89). Furthermore, four critical elements to teaching professional and humanistic values have been suggested: (1) experiential learning of skills; (2) critical reflection on experiences; (3) a supportive and validating small group environment; and (4) a longitudinal design – the last element reinforces the other three processes (90).

It has been estimated that a medical doctor will conduct approximately 200,000 medical consultations during their career (91). Well-functioning communication between the patient

and physician is crucial in all these consultations. Physicians need to establish trust, demonstrate empathy, and explain medical information in a way that the patient will understand. Patient-centered communication is an essential component of medical professionalism, as it enables doctors to respect patient autonomy and ensure that patients are well informed and actively involved in their own healthcare decisions (92, 93).

Studies regarding medical students' patient-centeredness and other professional attributes have yielded varying results. Some studies have shown a significant decline in medical students' attitudes toward and skills in clinical communication, patient-centeredness, and empathy (94-96), while others have found an increase in these attributes or a stability in them throughout medical education (97). A recent study investigated the development of patient-centered orientation among a group of Italian medical students (98). The results showed that the students became more patient-centered with regard to "sharing" (i.e. attitudes regarding information sharing and involving patients in decision-making) over the course of their training in medical school. By contrast, there were no significant changes in relation to "caring" (i.e. the expression of empathy, warmth and recognition of patients as whole individuals). However, the medical students who scored low in patient-centeredness at the beginning of the study scored significantly higher in the last measurement, and vice versa (98).

A nationwide study in Norway in 2003 showed that medical students' attitudes toward learning and using communication skills remained largely unchanged during medical school (99). A follow-up study was completed in 2015 with students from two of the Norwegian medical schools, one with a traditional and another with an integrated curriculum. In the study, the students' attitudes toward acquiring communication skills improved at both schools, although students within the integrated curriculum showed more positive attitudes than those in the traditional medical curriculum (100).

8.4 Group-based mentoring

In the following sections, I will provide an outline of existing knowledge of group-based mentoring for undergraduate medical students.

One major advantage of group mentoring is the opportunity for peer learning and collaboration. If the aims of mentorship include personal and professional development, it seems reasonable to establish group-based mentoring in which the collective experience and knowledge of several individuals is available. It allows peers and mentors from diverse backgrounds and with different resources to reflect on social interactions together and share their experiences (101). Furthermore, professional development involves participating in reflective discussions with others (89). Collaboration, communication and reflective conversations in group settings are central to all health care professionals' daily lives (81). While one-on-one mentoring allows for personalized feedback on individual students' unique educational experiences and vulnerabilities, a group setting can provide a framework that also fosters well-functioning relationships. This in turn promotes a sense of community and belonging, which is particularly valuable in the demanding and often isolating environment of medical education (102). Moreover, mentoring a group of students can be particularly beneficial when there is a limited number of available mentors (33). Some studies indicate that the optimal group size can vary depending on the aim of the mentoring. In other words, smaller groups (<10 mentees) may be more effective for fostering personal connections and offering individualized support, whereas larger groups (>10 mentees) may be better suited for addressing professional concerns (80).

Numerous literature reviews on mentoring in medical education have been published in recent decades (22, 28, 33, 47, 49, 80, 103, 104). To our knowledge, there are no reviews specifically targeting group-based mentorships for medical students. A review of studies

listed in Medline from 1966 to 2002 identified nine formal mentoring programs for medical students (103). Seven of these programs were established at medical schools in the United States, while one was created in Germany and another in the Netherlands. Most lacked thorough evaluation strategies and had loose structures. Only two were group-based, with either peer mentors (105) or faculty members serving as mentors (106). In the peer mentoring program, the aim was to provide support for first-year medical students in their everyday student lives during the first six months of medical school. The mentors were second- to fourth-year students (105). In the second group-based program, with faculty members serving as mentors, the goal was to develop students' understanding of the medical profession and get them acquainted with highly motivated and qualified researchers. The program ran in the first two years of medical school (106).

In a review of the PubMed literature between 2000 and 2008 on mentoring programs for medical students, the authors recognized 14 formal programs, all in the United States (33). Eight of the programs were either solely group-based, with faculty members or senior physicians as mentors (106, 107), or provided a combination of group and one-on-one mentoring (25, 70, 108-111). The aims and approaches of the group-based mentoring programs varied greatly, from career advice and mentoring for disadvantaged students such as underrepresented minorities (109) to clinical and personal support throughout the duration of medical school (70). In Germany, in a study on the prevalence and characteristics of mentorship programs for medical students (58), 16 out of 20 responding medical schools offered group-based mentoring for their students. The mean ratio of mentors to mentees were 1:9.9. Contrary to the findings of Frei et al. (33), the most frequently mentioned aim of the group mentorships was to improve academic achievement. Despite a growing amount of research on mentoring, developing an evidence-based approach to group mentoring in

medicine that guarantees consistent experiences for mentees and mentors, and fosters effective relationships, remains a challenge (49).

8.5 Study context

While the first paper in this thesis is a systematic review of group-based mentorships globally, the second paper is based on quantitative data from mentors at three universities: UiT The Arctic University of Norway; the University of Bergen, Norway; and McGill University in Montreal, Canada (the CanNorMent study). In the following sections, I will present details on each of the group mentorships. For an overview of the main elements of the three programs, please see Table 3 in Paper II.

8.5.1 UiT The Arctic University of Norway (UiT)

The mentorship program at UiT was implemented in 2012 and runs in the first four years and the sixth year of medical school. The mentorship is part of the university's professionalism program, PROFKOM, in which the main themes are learning communication skills and ethics, understanding the physicians' role and professional behavior, and collaboration with other health care professionals. The mentorship groups are the main arena for experiential learning in PROFKOM. Group meetings are mandatory, and the meetings take place on campus. It is also mandatory for students to have a one-on-one conversation with one of the mentors each year. Each group meeting has one or more predetermined topics or activities. See Table 1 in Paper III for an outline of topics and activities for the groups in Years 1 to 4.

At the time of this study, each class of 110 students has around 14 groups with two mentors each. In each group, seven to nine students meet with their two mentors four times a year, i.e. 16 hours in total per year. The mentors must be physicians and must have a formal affiliation with UiT, the University Hospital of North-Norway (UNN) or both. They do not receive

additional financial compensation for being mentors. To prepare for the mentoring role, a half-day orientation seminar is offered to mentors in addition to an annual one-day seminar focusing on how to establish group dynamics and lead a group. There are large differences between the mentors' levels of experience and prior training in communication skills and ethical reflection.

8.5.2 The University of Bergen (UiB)

The medical faculty at UiB initiated a new mentorship program in 2014 as part of a curricular reform, with an emphasis on professional identity formation. At the time of the study, the mentorship constituted a second step in a 6-year professionalism program, where the first step was an extensive course in patient contact during first year of medical school. At the beginning of second year, mandatory groups of eight students and two physicians were established. Each class had 160 students with 20 groups and 40 mentors.

At the beginning of third year, the class is split into two halves separated by a term, resulting in students in the same group having slightly different experiences. The groups meet for a total of 12 hours per year in addition to an optional one-on-one conversation with one of the mentors. The meetings often take place off campus. As with UiT, group meetings are mandatory, and the students must have at least a 75% attendance rate. Mentors are recruited through informal networks, snowballing techniques and information in local medical journals, with the aim of enrolling physicians with as varied backgrounds as possible.

Most of the mentors have no formal affiliation with the faculty, and all receive financial compensation of NOK 6,000 per year in addition to CME credits. All mentors get a copy of a textbook on medical professionalism used by the students in their first year. To prepare for mentoring, a half-day orientation workshop is offered. All mentors are invited to a follow-up half-day workshop and celebratory dinner once a year. In the group meetings, the content and

methods are left open for the mentors and mentees to decide based on a written curriculum describing the program's aims, with examples of topics and methods that mentors can choose.

8.5.3 McGill University

The Faculty of Medicine at McGill University developed a mentorship program in 2005 called the Physician Apprenticeship (PA). The groups are formed in first year and remain stable throughout undergraduate medical school, which lasts for four years in Canada. As in UiT and UiB, the students are randomly assigned to groups, with no attempt to match mentors with mentees. The groups meet approximately five times per year, and there are occasional one-on-one meetings. The mentors have their own title – "Osler Fellows" – and are practicing physicians recruited from all medical specialties. Each medical class comprises approximately 180 students, with 30 groups in each class, for a total of 120 in the school at any time. Each PA group also has a co-leader who is a senior medical student.

The mentors are offered a faculty development program to prepare them for the mentoring role. During the past decade, half-day faculty development workshops with the following topics have been organized: the concepts of physicianship, professionalism, professional identity formation, healing in medicine, small-group facilitation skills, narrative medicine, reflection, critical consciousness, medical errors, medicine's "social contract" with society, the hidden curriculum and learning environment, cultural sensitivity and diversity. Participation in faculty development activities is rewarded with CME credits.

10 Aim and research questions

It remains a challenge to establish a standardized evidence-based approach to mentoring in medicine that would provide consistent mentoring experiences for mentees and foster effective mentoring relationships (49). Much is known about mentoring for medical students; however, research on mentoring has been directed in large part toward one-on-one formats. Limited knowledge exists regarding the variability of group practices and the factors that influence the motivation and satisfaction of group mentors and how to achieve sustainable, structured, longitudinal group-based mentorships in medical education. To target interventions for improvement more effectively, we aimed to identify and understand the factors that contribute to successful, long-term group-based mentorship programs for undergraduate medical students. Additionally, we wanted to explore how group-based mentorships influence medical students' attitudes and perspectives toward professional and humanistic values.

To achieve this, we formulated the following research questions:

- What is currently known about group mentorship programs for undergraduate medical students that focus on professional development, and how are these programs structured and evaluated? How can such programs be efficiently organized and assessed?
- How satisfied are the mentors with the mentoring experience at three universities, and which putative factors are associated with level of satisfaction?
- How do medical students at UiT The Arctic University of Norway evaluate the group-based mentorship program? Could the group-based mentorship program within the new curriculum significantly enhance medical students' self-assessed clinical

preparedness and shift their attitudes towards communication skills and patient-centeredness in a positive direction?

11 Methods

Two methods were used in the papers underlying this thesis: 1) a systematic literature review and 2) self-reported data from a questionnaire survey of both mentors and medical students. In the following sections, the background and methodological decisions are presented. Some of the information may overlap with what is described in the three papers.

11.1 Paper I – Systematic Review

Literature searches conducted in 2017 showed a knowledge gap with regard to how group mentorships in medical schools were organized and evaluated globally. Several reviews regarding mentoring for medical students had been published at the time, highlighting key advice for faculties that were considering establishing mentorship programs. These reviews explored a wide range of mentoring formats, mostly one-on-one mentorships, and the landscape of group mentorship was ambiguous. We could not find published reviews specifically targeting group mentorships for medical students. Therefore, we decided to conduct a systematic review, as this is an efficient way to collect and synthesize existing knowledge (112).

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Guidelines were followed during the review process. PRISMA is a method of gathering and systematizing data that enables visualization of the process of data retrieval and the criteria of inclusion and exclusion that impact the final selection of papers (112). This allows for a transparent process in which the reviewers can report why the review was conducted, what they did and what they found.

A medical librarian helped me choose a broad set of relevant search terms; see Appendix 1 in Paper I for the complete search strategy. We used the PICO strategy (population, intervention,

comparison, outcome) for the selection process, which is presented in Table 2 in Paper I. PICO is a widely used strategy for defining research questions in health care research (113). According to the Cochrane Library, three types of PICOs in Cochrane reviews exist: 1) Review PICOs, 2) Comparison PICOs, and 3) Included Study PICOs. In our case, we used Review PICOs to formulate questions, build search strategies and decide which papers to include.

Most of the included papers used a quantitative design for evaluation of the group mentorship. We assessed the quality of the quantitative studies by using the Medical Education Research Study Quality Instrument (MERSQI) (114). MERSQI was introduced in 2007 as a method for measuring the quality of studies of medical education by evaluating the research methodology more than the quality of the reporting (115). It has been validated and widely used since then (116). The MERSQI consists of ten items reflecting six subjects: study design, sampling, type of data, validity of evaluation, data analysis and outcomes.

As a framework for categorizing the evaluation approaches used in the included papers, we utilized Kirkpatrick's four-level evaluation hierarchy (117), which was designed nearly 50 years ago to assess interventions in medical education (118). Level 1 describes how the participants responded to the educational program or training (e.g. level of satisfaction), Level 2 assesses the extent to which the respondents have learned something (e.g. increased knowledge or gained skills), Level 3 explores whether the respondents are utilizing their new knowledge (e.g. changed behaviors) and Level 4 examines whether the training is having a positive impact on the whole organization.

11.2 Likert scale in questionnaires

Since the questionnaires used in Papers II and III are based on Likert scales, a brief introduction is appropriate. In 1932, the organizational and social psychologist Rensis Likert

developed the Likert scale to measure attitudes and feelings toward international business affairs. Since then, the scale has become a prevalent method of grading in questionnaires. The typical Likert scale is a five- or seven-point ordinal scale used to rate the degree to which a respondent agrees or disagrees with a statement (119). It is considered an ordinal scale because it captures the relative rank or order of responses. Respondents can indicate their level of agreement or disagreement with a statement by using a predetermined set of answer options, typically ranging from "strongly agree" to "strongly disagree," with a neutral midpoint such as "neither agree nor disagree" (119).

The response options on a Likert scale have a specific order, but the space between the options may not be equal. For example, the interval between "agree" and "strongly agree" is not necessarily the same as the interval between "agree" and "neither agree nor disagree." This is unlike interval data, in which the difference between the values is the same (120). By analyzing the distribution of responses across a Likert scale, one can gain insight into the strength and direction of attitudes in a population (119).

11.3 Paper II

11.3.1 Survey development

The aim of the CanNorMent project was to map the breadth of group mentors' experiences and evaluations at the three universities included, making it possible to describe the overall functioning of the group mentorship as seen from the mentors' perspectives. At the time, there was no validated questionnaire template available that covered the research aspects, so authors Edvin Schei (ES) and J. Donald Boudreau (JDB) designed the questionnaire building on existing knowledge and experiences. The questions regarding topics discussed in the groups, the mentors' experiences, and personal and professional development were inspired by Stenfors' research (121).

The questionnaire contained the following sections: basic demographics, mentor satisfaction, individual perceptions of mentorship approaches and goals, topics used in group discussions, mentor recruitment strategies, topics related to administrative issues, institutional support, faculty development, and experiences with and attitudes toward co-mentors. In total, it consisted of 36 questions and took approximately 10 minutes to complete. It was pilot tested on three mentors in both Canada and Norway, leading to minor changes. It was distributed using the platform SurveyXact. The questionnaire is available in Appendix 1.

11.3.2 Invitation of mentors

In May 2017, all faculty members of the three medical schools who had participated in the mentorship programs (graduation years 2013–2020, n = 461) were invited by email to participate in the study. Two reminders were sent automatically to non-responders after one and three weeks. Invitation emails to the Norwegian mentors were nearly identical, but in Norwegian, with a forewarning that the survey instrument itself would be in English. The mentors did not receive any compensation for participating. The categories, items and responses in the questionnaire are presented in Appendix 1 in Paper II. Responses were stored on a high-security server (SAFE) at UiB where all analyses were carried out on encrypted files.

11.3.3 Statistics

The data were analyzed by IBM SPSS (Statistical Package for the Social Sciences) version 28.0–29.0 (IBM Corporation, Armonk, NY, US) for Mac. Descriptive statistics were used to explore frequencies, means and distributions. We conducted factor analyses to develop indices that were used as independent variables in the analyses of mentors' satisfaction. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy, along with Bartlett's test of sphericity (122, 123), was performed to decide the appropriateness of the factor analyses. We

used multilevel linear regression to explore the association between the primary outcome (mentors' satisfaction) and the Level 1 (individual) and Level 2 (university) predictors. The significance level was set at 5%.

We decided to aggregate the data from all the mentors to gain a larger sample size. Mentors at McGill University accounted for approximately 50% of the responses, so we conducted a chi-square test after dichotomizing the mentors' satisfaction outcome variable. The distribution of the outcome did not significantly differ between the universities ((χ^2 (2, N = 272) = 1.78, p = 0.41)); thus, it was found to be adequate to aggregate the responses.

Because of the nested data structure in this study, we decided to conduct multilevel modeling (also known as hierarchical or mixed effects regression), which extends the traditional linear regression model by accounting for the clustering of observations within higher-level units (124). In a multilevel linear regression, the data is organized into multiple levels or groups, with observations nested within each level (e.g. mentors nested within universities). The aim is to explore the link between a dependent variable (in this case, mentors' satisfaction) and independent variables while simultaneously accounting for the potential influence of the higher-level units, such as belonging to UiT, UiB or McGill University.

There are some statistical tests that can indicate the need for multilevel modelling. One of these is known as the Intraclass Correlation Coefficient (ICC) (125). The ICC can be used to assess the degree of similarity or agreement among observations within the same group. In the context of multilevel data, the ICC helps to determine the extent to which the outcome variable varies between the higher-level units compared to *within* the units. It provides information about the similarity of observations within each group. We measured the ICC as 0.034. The higher the ICC, the more probable it is that there is large variation between groups (in this case, that there is large variation between the mentors at the three universities),

suggesting that belonging to a specific university has a strong influence on the outcome. Conversely, a low ICC suggests that most of the variation is within the groups, indicating that group membership has little impact on the outcome variable.

Furthermore, the need to conduct multilevel modeling can be assessed by the design effect (DEFF) (126). A rule of thumb is that if DEFF is below 2, researchers do not need to analyze data in a multilevel analysis because the degree of bias in the standard error is acceptable. In our case, DEFF was greater than 2 (124).

In a study published in 2011, the authors showed how the type 1 error rate could be affected by different conditions of intraclass correlation and sample size. The findings showed that when analyzing data with a hierarchical structure, it is nearly always necessary to conduct multilevel modeling to avoid type 1 errors (127). This, along with a DEFF greater than 2, led to the decision to conduct multilevel regression in Paper II.

Tests for collinearity between the covariates were performed by measuring the variance inflation factor (VIF). Collinearity means that there is a degree of linear relationship or correlation between predictor variables, thus making it difficult to identify their individual effects on the outcome variable. The VIF quantifies the degree to which the variance of one predictor can be explained by the other predictors in the statistical model. If the VIF is less than 5, this usually implies that there is little collinearity (128). We found a low level of collinearity with mean VIF = 1.672.

11.4 Paper III

11.4.1 Survey development

The author Tor Anvik developed a questionnaire that contained 28 questions concerning evaluation of the medical curriculum and group mentorship at UiT and 39 questions that aimed to measure the students' attitudes toward learning communication skills and patient-centeredness.

Regarding evaluation, the students were asked to what extent they felt that the curriculum in general and specific teaching methods had prepared them for clinical practice. The other 39 questions regarding attitudes were based on two validated tools. The first tool was the Norwegian version of the Communication Skills Attitudes Scale (CSAS) (129, 130). Around half of the statements were positively worded, with the other half being negatively worded, and they were presented in a haphazard order (130). The CSAS was developed by Rees, Sheard and Davies in 2002 and has become a widely used scale for identifying medical students' attitudes toward learning communication skills (131). The Norwegian version was developed in 2003 and piloted on a sample of 78 Norwegian medical students, with none reporting difficulties in understanding the questions (130). It comprises 22 statements regarding attitudes toward learning communication skills, see Table 2. The second tool was based on a questionnaire exploring medical students' attitudes toward patient-centered versus physician-centered practice (132). We included five questions that were found to specifically measure patient-centered attitudes, see Table 6 in Paper III (132).

Table 2 Items comprising the Norwegian version of the CSAS

No.	Statement*
1	In order to be a good doctor I must have good communication skills
2	I can't see the point in learning communication skills
3	Nobody is going to fail their medical degree for having poor communication skills
4	Developing my communication skills is just as important as developing my knowledge of medicine
5	Learning communication skills has helped or will help me respect patients
6	I haven't got time to learn communication skills
7	Learning communication skills is interesting
8	I can't be bothered to turn up to sessions on communication skills
9	Learning communication skills has helped or will help facilitate my team-working skills
10	Learning communication skills has improved my ability to communicate with patients
11	Communication skills teaching states the obvious and then complicates it
12	Learning communication skills is fun
13	Learning communication skills is too easy
14	Learning communication skills has helped or will help me respect my colleagues
15	Learning communication skills has helped or will help me recognize patients' rights regarding confidentiality and informed consent
16	When applying for medicine, I thought it was a really good idea to learn communication skills
17	I don't need good communication skills to be a doctor
18	I think it's really useful learning communication skills on the medical degree
19	My ability to pass exams will get me through medical school rather than my ability to communicate
20	I find it difficult to take communication skills learning seriously
21	Learning communication skills is important because my ability to communicate is a lifelong skill
22	Communication skills learning should be left to psychology students, not medical students

*=Likert scale ranged from 1 – Strongly disagree to 5 – Strongly agree

11.4.2 Invitation of students

The questionnaire was adapted to the survey platform Questback and distributed by email to all students in fifth year (the first class of medical students following the new curriculum, n = 88) and all students in sixth year (the final class of students in the old curriculum, n = 90). The first invitation was sent out in March 2017. After a total of three reminders, only a total of 65 out of 186 students had responded. In consultation with student representatives and with support from the PROFKOM committee, the project group chose to use an incentive (one randomly selected respondent could win an iPad) and the students' Facebook network to reach as many students as possible. As of June 30, 2017, the fourth and final invitation had generated a total of 50 new responses from the two cohorts.

11.4.3 Statistics

The statistical analyses were performed in SPSS version 29. Descriptive statistics were conducted to explore medians, frequencies and distributions. The Mann–Whitney U-test for two independent samples was used to explore the differences between "NC-students" (= New Curriculum) and "OC-students" (= Old Curriculum) regarding curriculum evaluation and the students' attitudes toward teaching communication skills and patient-centeredness. The significance level for the analyses was set at 5% ($p < 0.05$).

The Mann–Whitney U test (also known as the Wilcoxon rank-sum test) is a nonparametric statistical test used to compare the distributions of two independent groups (133). Tests of normality showed that the data did not meet the criteria of normality and equal variances. The Mann–Whitney U test works by ranking all the observations and then comparing the sum of ranks for one group to the sum of ranks for the other group. The test statistic (U) shows the probability that a random observation from one group will have a higher rank than a random observation from the other group (133). The effect sizes (r) were found by dividing the

standardized test statistic (Z) by the square root of the number of observations. According to Cohen's categorization of effect sizes (134), 0.1 is considered small, 0.3 is considered a moderate effect, and values of 0.5 or higher imply a large effect.

12 Ethical considerations

According to Norwegian law, application to the Regional Committees for Medical and Health Research Ethics (REC) is required to gain ethical approval for health research projects where sensitive personal data is used. This was not relevant in this thesis, as the dataset did not involve the solicitation of sensitive data related to health or disease. In both Papers II and III, informed consent was obtained from all subjects. All participants were informed of their right to decline to answer any questions and their right to withdraw from the study at any time with no consequences. The study in Paper II was approved by the Institutional Review Board at McGill University (Study Number A03-B16-17B). Additionally, both Papers II and III were approved by the Norwegian Centre for Research Data.

13 Main Results

Paper I

Skjevik EP, Boudreau JD, Ringberg U, Schei E, Stenfors S, Kvernenes M, Ofstad EH.

Group mentorships for undergraduate medical students – a systematic review

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In this systematic review, we found a total of 20 studies that described 17 group mentorships in seven countries. The large number of programs compared to earlier reviews may indicate that establishing group-based mentorships is an increasing trend in medical education. The identified programs differed greatly regarding their organization and methods of achieving their aims related to professional development. Most of the evaluations were conducted by a single-group cross-sectional design and reported findings consistent with Levels 1 (reaction/satisfaction) and 2 (learning, based on self-reports) on the Kirkpatrick four-level evaluation model. The evaluation data were remarkably supportive of the practice of mentoring medical students in groups, indicating increased personal and social support and improved satisfaction with medical school among the students. In some evaluations, mentors also reported benefits, such as increased feedback and communication skills and professional development. Based on the findings, we propose some recommendations for the organization of group mentoring programs: 1) the mentorship program should be longitudinal; 2) mentorship activities should be designed to fit the overall curriculum; 3) meetings should be mandatory; 4) mentors should be experienced physicians and may be accompanied by a student mentor (a “near peer” mentor); 5) to reduce “wear and tear,” mentors may receive financial compensation or academic promotion; and 6) mentors should be supported and guided in their role by mentor gatherings, workshops and faculty development.

Paper II

Skjevik EP, Schei E, Boudreau JD, Tjølsen A, Ringberg U, Fuks A, Kvernenes M, Ofstad EH.

What makes mentors thrive? An exploratory study of their satisfaction in undergraduate medical education

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The aim of this paper was to measure mentors' self-reported satisfaction with the mentoring experience and to explore associations between satisfaction and its putative factors. We distributed an online survey to all physician mentors in three group mentorship programs: UiT The Arctic University of Norway (n = 114, response rate 53%), the University of Bergen (n = 123, response rate 61%) and McGill University in Canada (n = 224, response rate 61%). On a scale from 1 to 5, the mean mentor satisfaction score at two Norwegian and one Canadian medical school was 4.55 (95% CI 4.47, 4.64). In a multilevel multivariate regression analysis, two predictors were significantly associated with mentors' satisfaction: 1) the perception that students found the group meetings valuable (β = 0.186, 95% CI 0.021, 0.351, p = 0.027) and 2) mentors' perceived rewards (β = 0.330, 95% CI 0.224, 0.437, p < 0.001). Perceived rewards included experiencing gratifying relationships with students, and mentors' perceptions of self-development.

Paper III

Skjevik EP, Anvik T, Ringberg U, Ofstad EH.

Attitudes of medical students towards communication skills and patient-centered care: the impact of group mentorship

Submitted for publication to the International Journal of Medical Education

In this study, we wanted to explore medical students' self-assessed preparedness for clinical practice and attitudes toward learning communication skills and patient-centeredness, before and after introducing a new curriculum with a longitudinal group-based mentorship program at UiT The Arctic University of Norway. We found that the first class of medical students (NC-students, n = 88, 57.9%) scored significantly higher than the final class of students in the old curriculum (OC-students, n = 90, 53.3%) (Mdn = 4 and 3, U = 828.5, p = 0.003). Additionally, the NC-students scored significantly higher than the OC-students when asked how the curriculum had prepared them for communicating with patients (Mdn = 4 for both groups, U = 748.5, p <0.001), and on how the curriculum had prepared them for ethical reflections (Mdn = 4 for both groups, U = 951.5, p = 0.043). When asked how the mentorship groups and PROFCOM had prepared them for clinical practice, NC-student had a median score of 4 on both items. On the CSAS, the NC-students scored significantly higher on three items that were positively worded and lower on two that were negatively worded, On the five items regarding patient-centeredness, the NC-students had higher scores on all five statements, though none of these differences were statistically significant.

14 Discussion

In the following sections, I will first update the review in Paper I with recent publications on group mentorships for medical students. Second, I will discuss some methodological considerations before beginning a more general discussion of the findings in Papers II and III. Third, I will provide some recommendations for future research on group mentorships.

14.1 Update of Paper I

To the best of our knowledge, Paper I is the first systematic review to explore group-based mentorships for undergraduate medical students. However, it has been a while since it was published, and I therefore decided to update the literature review with records published from August 2019 to November 2023 using Medline as a search engine. The rationale for conducting the search in Medline was that most of the records included in Paper I were listed in Medline, and therefore the probability of finding relevant articles there was considered high. A total of six new records met the eligibility criteria; see Table 2 for the main elements of the programs. The papers originated from Canada (135, 136), USA (137), Israel (138, 139), Germany (140) and Brazil (141). As with the group programs in Paper I, faculty members or physicians were mentors in most programs (137-141). One of the programs offered peer mentoring, with the mentors being second-year students (136). One paper did not provide information about mentors (135), and two papers did not mention the year of establishment (135, 137). Two programs were recently established, in 2018 and 2016, respectively (136, 141). Two programs also offered a mentor-duo, where the mentor–mentee ratio was 2:6–8 in one program (137) and 2:2 or more in the second program (136). In the four remaining programs, the ratio varied from 1:6 to 1:10–12 (135, 138-141).

Contrary to Paper I, we found only two programs that were longitudinal throughout the medical curriculum (135, 137). One program was aimed solely at first-year medical students (136), and one was established during the first three years of medical school (138, 139). Two papers did not provide information about the duration (140, 141). In Paper I, we proposed that the group mentorship should be longitudinal. Although I only found two new programs with this design, I still believe that longitudinal group mentorships which aim at professional and personal development may be more advantageous than programs confined to a single or a few years. Longitudinal group mentorships allow students to start the process of professional development early and, especially if they are mandatory, underline the importance of the group mentorship program (142, 143). In a longitudinal program, the mentor-mentee relationship has the potential to undergo significant growth over an extended period, thereby fostering an environment conducive to reflective discussions. Furthermore, it is intuitively plausible that the establishment of group dynamics may require an investment in creating a safe learning environment, which may take time.

As with the programs described in Paper I, the meeting frequencies and structures differed greatly. The frequencies varied from weekly meetings (136, 138, 139) to three to five meetings per year (135). In this update, group discussions on professional challenges and attributes are still a key feature in several programs. Evaluations of the group mentorships by both students and mentors were, like the ones found in Paper I, remarkably positive. I think it is safe to say, based on the findings in Paper I and this update, that group mentorships for medical students that focus on professional identity development are an increasing trend worldwide. In Paper I, we discovered that most of these programs were established after the year 2000. In this update, I found that three out of the six programs were established in 2009 or later (136, 140, 141). This increasing trend may be associated with the acknowledgment of the significance of not only medical knowledge but also the cultivation of interpersonal

attributes such as communication skills, empathy and patient-centeredness (144). Group mentorship programs seem to align with this shift in focus, potentially explaining their increasing prevalence in recent years. Despite the inherent limitations of cross-sectional designs (which were the most prevalent evaluation method), the recommendations provided in Paper I still seem reasonable for medical schools that are considering establishing group mentorships.

In January 2024, a few months after the new literature search was conducted, an additional paper describing a group-based mentorship in Thailand was published (145). The authors reported that medical students received mentoring in groups of five students per mentor from second to sixth year of medical school. The aim of the mentorship was to get students to reflect on their experiences, to expose them to real clinical situations with guidance from their mentors, and to provide psychological support and personal growth (145). A self-reported evaluation showed that specific types of conduct by the mentors, such as giving positive reinforcement and providing feedback regarding their concerns, were significantly correlated to a reduced risk of burnout among the students (145).

A notable finding is that none of the identified papers were published in Norway even though there are at least two longitudinal group mentorship programs for Norwegian medical students. Only Sweden is represented among the Nordic countries in Paper I. We are certain that the 23 group programs are only a tiny percentage of existing programs, especially when considering the absolute number of medical schools worldwide. In Paper II, we describe the group mentorships at UiT and UiB in detail. We hope that when Papers II and III are published, other medical schools that are considering group mentorships can learn from our findings. The relatively low number of mentorships can be explained partly by the fact that we chose not to include the grey literature. This may have resulted in us missing insights from

group mentorships that have been established but not documented in peer-reviewed publications.

Table 3 Main elements of the group mentorship programs in the update of Paper I

Author	**Désilets (135)***	**Buck (137)**	**Riskin (138, 139)**	**Guse (140)**	**Neufeld (136)**	**Secchin (141)**
Country	Canada	USA	Israel	Germany	Canada	Brazil
Year established	-	-	1995	2009	2018	2016
Mentors	-	Faculty members	Physicians	Faculty members	MS-2	Faculty members
Mentees	MS-1 to MS-4	MS-1 to MS-4	MS-1 to MS-3	-	MS-1	-
Ratio	1:6	2:6–8	1:8–10	1:8	2:2 or more	1:10–12
Longitudinal	Yes	Yes	No	-	No	-
Mandatory	Yes	No	-	No	No	Yes
Evaluation	Yes	Yes	Yes	No	Yes	No

* = In this paper, group meetings are termed “workshops”; this term refers to group discussions with six students and one mentor.

14.2 Methodological reflections

14.2.1 Conducting systematic reviews

Systematic reviews play a fundamental role in evidence-based research, offering a comprehensive synthesis of existing literature on a specific topic (146). In many ways, they represent a "gold standard," as they provide a structured and rigorous approach to gathering and interpreting evidence. However, there are some pitfalls to navigate. One consideration is the search strategy, as inadequate search criteria may result in the omission of relevant studies. If a search contains too many words, it may become overly specific or broad and exclude potentially relevant articles. This can lead to a limited number of search results, potentially missing out on important studies. To ensure a relevant strategy and choice of databases, I consulted a medical librarian during the process. We used truncation marks (e.g. mentor*) to capture variations of the words used, such as plurals or different word endings. The keys ".ti,ab" allowed us to search for terms in the title and abstract fields.

While writing this thesis, I decided to employ the same search strategy as the original review to maintain consistency with Paper I. If we were to update this systematic review in the future, I believe that we would benefit from an expanded literature search and pre-registration of the protocol in the Prospective Registry of Systematic Reviews (PROSPERO) to enhance the robustness and reliability of the review. Expanding the literature search by incorporating additional keywords, minimizing truncations and adding more synonyms of search terms would ensure a more thorough investigation of the existing literature. Additionally, I would conduct the search without the English-language limitation. This would require time and resources beyond what was available while working on Paper I.

14.2.2 Reliability

Reliability refers to the consistency and precision of a research instrument (147). It concerns whether a questionnaire produces the same results when administered repeatedly to the same group or population. It is also an important aspect of literature reviews. When conducting a systematic literature search, it is advisable (but not mandatory) to pre-register the systematic review protocol in the PROSPERO (148). For some reason, we did not do that, and this oversight is a potential limitation of the review. However, we followed the established guidelines in PRISMA (Preferred Reporting Items for Systematic review and Meta-Analysis) to provide a transparent reporting of the process (149). Both PROSPERO and PRISMA allow for transparency in the performance of a systematic review and increase the reliability of published reviews (148, 149). To test the reliability of the data in Papers II and III, we could have checked test–retest reliability by administering the same questionnaire once more to the same group of respondents and assessing the correlations of the responses (150). In Paper II, we used Cronbach's alpha to ensure internal consistency among items in the same group (151).

14.2.3 Validity

Validity can be described as the degree of accuracy by which a concept is measured. It can be divided in two types – internal and external validity (147). Internal validity refers to whether the results actually represent what is being explored or whether they are susceptible to forms of bias such as selection bias (152). I will discuss the different types of biases in Chapter 14.2.4. In order to enhance internal validity, researchers should undergo thorough study planning, conduct rigorous analysis of data and ensure appropriate sample sizes (152). The term "external validity" is often used interchangeably with "generalizability". It expands upon internal validity by requiring that the study population represents the population from which

one intends to generalize the findings. In Paper II, we aggregated the data from mentors at three universities in two countries; this may have increased the external validity of the findings.

14.2.4 Questionnaires as a research method – Papers II and III

Before I move on to discussing some of the methodological processes of Papers II and III, I will introduce some of the key benefits and limitations of conducting questionnaire-based research.

One of the benefits of questionnaires is their level of efficiency. Questionnaires make it possible to collect data from many participants simultaneously, thus being cost-effective and time-efficient (153). They provide a standardized format for collecting data, ensuring consistency and allowing easier comparison and analysis. Furthermore, respondents may feel more comfortable answering sensitive or personal questions in a questionnaire, as it offers a degree of privacy compared to qualitative research, in which their identity is known. On the other hand, questionnaires provide limited opportunity for respondents to elaborate and provide nuanced explanations, potentially making it challenging to gain a comprehensive understanding of complex phenomena.

As in all research, there is a risk of response bias, where respondents provide inaccurate answers to questions, thus potentially affecting the validity of the data. Both Papers II and III are based on self-reported data, and such self-reporting can be biased by participants reporting what they believe is socially desirable rather than providing honest and correct information (154). None of the surveys asked for sensitive information (e.g. drug use), which is often related to social-desirability bias. However, some of the researchers involved in Paper II either were or had been leaders of the mentorship programs (JDB, ES and UR), and one might suppose that since the leaders of the programs were involved in the project, the participants

may have responded more positively. We believe that the fact that the questionnaires in both Papers II and III were anonymous (i.e. names and email addresses were removed prior to the analyses) minimized the risk of social-desirability bias, thus enhancing the reliability of the findings.

Another potential bias is low-response bias, where a lack of response may lead to a biased sample that does not accurately represent the target population, potentially affecting the generalizability of the findings (155). In a meta-analysis of survey response rates, the authors concluded that health sciences education researchers should aim to achieve a response rate of 67% or higher (156). We believe that both Papers II and III had acceptable response rates in this regard.

Another bias that may be associated with self-reported data is recall bias, whereby participants may not be able to recall and report their experiences accurately (157). As mentioned in Paper III, NC- and OC-students may have had some problems recalling how they experienced each of the mentorship activities four and five years ago, respectively. It may have been challenging for students to know whether their mentorship activities (e.g. a video interview with a patient in general practice in first year) have prepared them for clinical practice in their fifth year. A solution to this could be to conduct prospective studies like the one that investigated the development of students' patient-centeredness from second to fifth year of medical school (98).

I got involved in the CanNorMent project after the survey was developed and distributed to the mentors. Unlike the one used in Paper III, this questionnaire was not based on previously validated questionnaires, nor was it itself validated. Validity is an assessment of whether the survey method is really measuring what it intends to measure (158). Using a questionnaire

that has not been validated in the population of interest – in this case, group mentors of medical students – can increase the risk of measurement bias (158).

After my graduation, I was fortunate to have the opportunity to be a mentor for a group of sixth-year medical students located at Nordland Hospital in Bodø. In the process of writing this thesis, I completed the CanNorMent survey that was sent out to all mentors at the three universities in 2017. It took approximately 15 minutes to answer, which, in my opinion, was slightly too long. Too many questions in a survey can increase the risk of respondent fatigue (also known as survey fatigue), whereby the participants prematurely terminate the questionnaire or give less thoughtful answers to questions toward the end of the survey (159). When participants begin a questionnaire without completing it, this is called dropout attrition (160). In our case, every participant completed both questionnaires (in Papers II and III). A few mentors in Paper II did not answer some of the questions, such as the ones regarding interesting topics. We did not observe a tendency for mentors or students to answer more "equally" the further they progressed in the questionnaires. In the case of survey fatigue, one might assume that the respondents would have given more similar answers to questions further along, but we did not see that.

As mentioned above, another limitation of questionnaires is that researchers do not have the opportunity to clarify ambiguous or misunderstood questions in real time, resulting in participants misinterpreting questions and providing inaccurate responses (153). One example in the CanNorMent questionnaire is the recruitment question where one of the options was "I was strongly encouraged by the leader of my department," which in my view can be interpreted as implying that the mentoring was almost mandatory. Another example is the question regarding interesting topics, where I believe there is a discrepancy between the instruction to consider one's mentor group's level of interest in a topic and the actual wording of the question, which may be interpreted as referring to the level of interest of the individual

respondent. I believe that this could cause confusion, with mentors interpreting the question based on their personal interest rather than that of their group. Furthermore, the survey language in Paper II was English. There were some discussions of whether a glossary of selected key terms translated into Norwegian should be available to the Norwegian mentors, but it was not. We have no indication that language posed an issue, but I think that if we were to conduct the survey again, translating it into Norwegian would be beneficial.

I think that the potential challenges highlighted in this, and the previous sections underscore the necessity of using validated questionnaires in research, as we did in Paper III. A validated questionnaire is a survey or scale specifically designed for the intended participants, addressing concerns related to question length, language complexity and interpretation bias to ensure its effectiveness in collecting reliable data (161). In 2019, a study describing the design and validation of a dual-purpose questionnaire addressing mentors' and mentees' thoughts regarding mentoring was published (162). This could potentially be relevant for a subsequent study on the experiences of both Norwegian and Canadian mentors and students.

14.2.5 Statistical considerations

We used parametric and nonparametric statistical methods in Papers II and III, respectively. In short, the difference between the two is that parametric methods rely on assumptions about the distribution of the data, while nonparametric methods do not depend on assumptions (163, 164). See Table 4 for the main assumptions of parametric methods, as described in the book *Discovering SPSS using IBM SPSS Statistics* (165).

Table 4 Assumptions of parametric methods

Assumption	Description	Assumption violated in Paper II?
Additivity and linearity	The outcome variable is linearly related to any predictors, and if there are several predictors, then their combined effect is best described by adding their effects together. This is the most important assumption (165).	No.
Normality	The data is distributed symmetrically around the center of all scores.	Yes. The p-value of the Shapiro–Wilk is <0.001. The outcome variable is positively skewed, meaning that the most frequent scores are clustered on the "positive" end of the scale (i.e. Likert 4–5).
Homogeneity of variance	Each population mean has the same variance (two or more samples).	Not relevant, as we decided to aggregate the responses from the three universities.
Independence	Each observation is independent of another.	No. The value of the Durbin–Watson test was 1.87, indicating that the variables were uncorrelated (165).

As mentioned in Chapter 11.3.3, we performed a multicollinearity test to check whether the predictor variables were highly correlated with each other. This assumption is only relevant in the case of multiple linear regression. If multicollinearity is present, the model will not be able to accurately associate variance in the outcome variable with the correct predictor variable, leading to incorrect inferences (165). This was not the case in Paper II, as mean VIF was low (<10).

Nonparametric methods are often used when the assumptions of parametric analysis are not met or when the relationship between variables is not linear. Additionally, nonparametric methods are often selected if the dependent variable's level of measurement is nominal (categorical) or ordinal (164, 166). Traditionally, there has been a consensus that continuous variables (i.e. variables that can be measured to any level of precision) should be used in parametric statistics and that one might obtain incorrect results if parametric methods are utilized when the data "violates" the assumptions for parametric statistics (163, 164).

There has been a long-standing debate over whether ordinal data from Likert scales converted to numbers can be analyzed with parametric methods (167). Parametric methods are more powerful for similar sample sizes, meaning that they are more likely to find a difference between groups when a difference exists, thus achieving more precise results than nonparametric methods (119, 163). In 2010, Dr. Geoff Norman published a comprehensive paper that showed that parametric tests are generally more robust than nonparametric ones and that they can be used with ordinal data, such as data from Likert scales. Furthermore, he argued that parametric tests can give the right answer even when statistical assumptions are violated, such as type of scale and assumptions of normality (166). The central limit theorem is also used as an explanation for the fact that parametric methods may be applicable to non-normally distributed data if the sample size is suitably large, i.e. 30 or more observations (168).

In the process of choosing which analyses to use in Paper II, we had some discussions on whether to use parametric or nonparametric statistics. Parametric methods allow for more flexibility in modeling the relationship between variables and can handle complex models with multiple predictor variables. In our case, we wanted to conduct multilevel modeling, as the data had a nested structure. Formally, it may have been more correct to use Spearman's rank correlation (nonparametric correlation) on this data. Spearman is the most-used rank correlation; it disregards the numerical values (1–3 or 1–5), only considering the order (169). However, we actually obtained the same results using parametric methods because we converted a numerical value into an order, and when the data has the numbers 1 to 5, they also have the order 1 to 5. This way, we disregarded whether the distance between each number was large or small.

To illustrate this point, I conducted Spearman's rank correlation analysis between mentors' satisfaction and the predictor variables in SPSS. Eleven predictors were significantly correlated with mentors' satisfaction, with a rho ranging from -0.313 to 0.496. These 11 predictors were the exact same variables that were statistically significant in the linear regression analyses. This suggests that the relationship between the predictors and the outcome variable (mentors' satisfaction) were similar in both the nonparametric and the parametric (univariate linear regression) analyses. Another reason for the decision to conduct parametric analysis on the data was that it is difficult to adjust Spearman's rank correlation for covariates (170).

In Paper III, we chose the Mann-Whitney U-test for two independent samples to explore the differences between NC- and OC-students regarding curriculum evaluation and the students' attitudes towards teaching communication skills and patient-centeredness. As this is an ordinal test, medians are recommended according to the APA style (171). The median is the middle value of a dataset when it is ordered from smallest to largest (172). If there is an even

number of observations, the median is the average of the two middle numbers. The median is less sensitive to outliers and skewed data. As opposed to Paper II, we have limited information in Paper III about the dataset's distribution. Using the mean provides a more comprehensive view, while the median does not consider the precise value of each observation (172).

14.3 General discussion of the findings

14.3.1 The well-being of mentors

A critical component in mentoring is the mentors. As mentioned above, the group mentors in medical education are often physicians working in faculty, as clinicians or a combination of the two. At UiT, there are currently 123 actively engaged mentors, all of whom are physicians by background. 113 mentors are located in Tromsø, 8 in Bodø and 2 in Finnmark (as of January 2024). To the best of our knowledge, Paper II is the first study that explores group mentors' experiences at three medical schools in two countries. We aimed to determine the level of satisfaction among the mentors regarding the mentoring experience and to identify potential factors associated with their satisfaction. We found that the mentors were significantly more satisfied in their roles if they found that the students valued the group meetings and that they also benefited from self-development and experienced gratifying relationships with the students. This is similar to what we found in Paper I in studies exploring group mentors' experiences; the mentors reported experiencing both personal and professional growth (173-175), gratification in witnessing the professional development of their students (173-176) and an enhancement in their own communication and feedback skills (73). Furthermore, we proposed that the mentors' experienced psychosocial rewards, as well as their competence at establishing well-functioning group dynamics, should be key components of faculty development.

If mentors thrive, it is more likely that they will engage with their mentees and commit to their development (177). If they enjoy being mentors, one can assume that they will be more likely to prioritize and allocate time for mentoring activities. Physicians often have demanding schedules, and if mentoring is seen as an additional burden or something to be done reluctantly, this will probably affect the results. Behaviors are often driven by attitudes,

and a positive attitude toward mentoring can create a nurturing and empowering environment for both mentors and mentees, enhancing the overall learning experience (56).

Mentoring can also be a powerful tool for inspiring doctors to be more patient-centered in their own clinical conduct. Paper III showed that attitudes toward patient-centeredness were significantly more positive among students with a group mentorship program. I believe that mentors, by guiding and teaching mentees about the importance of patient-centered care, will perhaps reinforce these values through their own professional conduct. Mentors working in the clinic may reflect on their own practice and adjust it to align with patient-centered approaches, ultimately benefiting their own patients.

14.3.2 The evolution of medicine

Just a century ago, physicians were often generalists and relied merely on caring and compassion when patients were faced with disease and illness (178). During the latter half of the 20th century, the medical field underwent a hugely significant transformation and witnessed an abundance of groundbreaking discoveries and advancements that transformed medicine, including the discovery of cortisone, the polio vaccine, kidney dialysis, organ transplants and the first CT scanner (179).

In an era of highly specialized medical fields, I think that it can be a challenging task to integrate specialized insights into a holistic form of patient care. In my view, the shift from generalization to sub-specialization makes it important to reflect on how we can maintain a comprehensive and patient-centered approach as physicians. In Paper III, the students that were part of the new curriculum with a mentorship program had significantly more positive attitudes toward patient-centeredness than the students without. It seems that group mentorships can address this challenge and foster a more holistic patient approach by bringing together medical students and mentors with diverse interests, personalities, experiences and

areas of expertise. By incorporating ethical reflections, demonstrations of and constructive feedback on patient encounters, both mentors and students can gain insights into not only the clinical aspects but also the emotional and psychological dimensions of patient care.

Although professional competence is cultivated within a social environment, it is still predominantly taught through paper case–based courses (143). Bedside teaching, i.e. teaching in the presence of a patient, is considered one of the most effective methods of clinical training due to its ability to foster professional identity and conduct and to demonstrate the history taking and clinical examination skills of a more experienced physician (180). Sir William Osler is seen as one of the great promoters of bedside teaching, as illustrated by the following quote: *"To study the phenomena of disease without books is to sail an uncharted sea, whilst to study books without patients is not to go to sea at all"* (181). Abraham Flexner emphasizes the importance of bedside teaching in his 1910 report, arguing that direct patient contact and observation are essential for medical students to learn the "art of medicine" (7). However, there is a consensus that there has been a decline in the amount of bedside teaching in medical education and that clinical examination skills have deteriorated in recent decades (180, 182).

The author of a recent paper proposes that *"[d] e-Flexnerization of clinical sciences and practice is de-intellectualization of clinical decision making and care, and technicalization of patient-clinician relationship"* (183). He implies that there has been a shift in medical education and physicianship toward relying increasingly on diagnostic tests (like laboratory tests and radiological modalities) to reach a diagnosis, rather than placing a strong emphasis on bedside learning and detailed clinical examination, including making appropriate observations and history taking (183). Bedside teaching has been estimated to represent approximately 75% of clinical teaching during the first half of the 20th century, compared to less than 20% in modern medicine (184).

There are several reasons for this shift. First, time constraints among both physicians and students can eventually lead to limited time for bedside teaching during ward rounds. Second, the evolving nature of teaching hospitals, including shorter patient stays and a generally increased workload, may have contributed to fewer bedside teaching opportunities (182). However, the "Flexnerization" of medical education, with its increased emphasis on evidence-based medicine and science, has enabled physicians to lean on forms of diagnostic testing such as echocardiograms and laboratory tests, which may enable a straightforward diagnosis. This allows physicians to prioritize effectiveness over thorough clinical examination, especially when they are dragged in several directions because of a high workload (180, 183). Furthermore, it has been reported that physicians' ability to communicate and examine patients has been negatively impacted by the increasing reliance on technology (e.g. patient encounters on Skype) as a replacement for in-person interactions (182).

It is my view that as the medical field has become more complex and specialized, the expectations placed on doctors and the healthcare system have increased hugely. We are now facing higher expectations regarding personalized care, quick diagnoses and effective treatments than our ancestors. A recent review revealed that new health professionals often feel burdened by the high and sometimes unrealistic expectations set for them during their transition from students to professionals (185). The pressure to meet demanding schedules, to keep up with evolving medical knowledge and to navigate complex healthcare systems can leave students and physicians feeling overwhelmed and detached from their patients. As a result, humanistic qualities may be overshadowed by the need for efficiency and technical expertise. This may be one reason why some studies have shown a worsening of medical students' attitudes toward learning, using skills in clinical communication, patient-centeredness and empathy as they progress through medical school (96, 186-188).

In Paper III, two of the highest-rated activities in the mentorship group were consultations with a simulated patient in the group and reflection notes on ethical challenges followed by group discussions. Participation in and demonstrations of patient meetings, either through live sessions or video-recorded encounters, may provide insight into effective communication and patient-centered care. These activities can serve as valuable learning tools, allowing students to model their behavior on positive examples of physician–patient interactions. Constructive feedback is crucial in this learning process, providing students with personalized insights and guiding them in refining their communication skills.

Empathy, the ability to understand and share the feelings of others, has long been considered a cornerstone of good patient care (96, 189). However, the fast-paced nature of modern medicine may leave little time for physicians and students to cultivate and express empathy. Self-empathy often receives little attention, and yet it is essential to physicians' and students' ability to sustain empathy toward others (189). Human brains have complex neural circuits that form the foundations for comprehending the experiences of others, resulting in compassionate actions (190). Nevertheless, the capacity for empathy diminishes when people are emotionally overloaded or overwhelmed or experience burnout (189). Hence, prioritizing self-care may be a way for medical professionals to maintain healthy levels of empathy (189). Group mentoring may be an avenue for facilitating habits of self-care. By sharing their experiences and coping mechanisms with peers and mentors, students (and potentially mentors too) can gain insights into various self-care strategies and a collective understanding of the importance of well-being in their medical careers.

14.3.3 Potential implications of group mentorships

Numerous studies have underscored the profound benefits associated with mentorship programs, including students' professional development, increased satisfaction as a medical

student and personal support (37, 69, 72-75). In the following sections, I will try to highlight the implications group mentorships may have for students' burgeoning careers as physicians, for mentors and for the health care system as a whole. I think that the ripple effects of group mentorships in medical education, if well-functioning, extend beyond individual students and mentors and may have the potential to influence the entire healthcare system.

As a student, being in a mentorship group may provide invaluable insights into the practical aspects of medical practice beyond what is learned in textbooks. Exposure to and reflections on real-world challenges, professional guidance, and practical advice from peers and experienced mentors can help prepare them for the role of physician, as showed in Paper III. As proposed in Paper I, mentorship should be a longitudinal and integral part of the medical curriculum. By emphasizing the importance of mentorship, medical schools can instill a positive culture and thereby ensure that medical students are prepared and eager to mentor students in the future.

Engaging with a group of students as a mentor provides an opportunity to contribute to the development of the next generation of healthcare professionals. Mentoring may foster a sense of fulfillment by passing on knowledge, experience, and ethical considerations accumulated over what may be several years of practice. Additionally, mentors can gain fresh perspectives from mentees, stay updated on current trends in medical education and enhance their own communication and leadership skills. This reciprocal relationship contributes to a collaborative and dynamic medical community.

By instilling a patient-centered approach, mentorship programs contribute to improved doctor–patient relationships, communication and shared decision-making. Furthermore, the collaborative learning environment promoted by mentorship programs may foster a culture of continuous improvement and innovation within the healthcare system, ultimately leading to

more efficient and patient-focused medical care. Overall, group mentorships for medical students hold great potential for shaping a future healthcare workforce that is not only clinically competent but also empathetic and committed to the holistic well-being of patients.

14.4 Future research

As mentioned above, a new systematic review on group mentorship programs for medical students would benefit from a wider range of literature search terms and fewer limitations to ensure the comprehensiveness of the review. I would like to encourage medical schools who have implemented group mentorships to describe their program and evaluations in the scientific literature to disseminate knowledge to those that are considering such programs. Moreover, more knowledge is needed about mentors in group-based programs. The findings of Paper II highlight some of the factors that influence mentors' satisfaction. How can medical faculties recruit physician mentors that are intrinsically motivated? Another interesting aspect would be to further explore both the mentors' and the students' opinions of what constitutes a well-functioning group. Such studies would ideally be designed as prospective studies in order to examine the influence of group mentoring features on both mentors and mentees over a certain period. It would be useful to compare medical schools with and without longitudinal group mentorship programs regarding both the students' attitudes toward professional attributes and the manner in which they interact with patients (this could perhaps be both patient-reported and self-reported, to study the extent of alignment between the patients' and students' perceptions).

In Paper I, we found that most evaluations of group mentorships are on Kirkpatrick's level 1 and 2 and we proposed that there is a need for additional research-driven evaluations to gain deeper insights into the impacts at Kirkpatrick's levels 3 and 4. Level 3 examines whether participants are applying their new knowledge, such as changes in behavior, while Level 4

assesses whether the program has a positive impact on the entire organization. To evaluate mentorship programs at these levels, one could conduct longitudinal studies tracking participants' behavior changes. Surveys, interviews, and performance metrics can be used to evaluate how students apply their skills and to measure the broader impact on e.g. patient satisfaction.

15 Conclusions

The insights from the three papers emphasize the significant potential of group mentoring programs as an educational strategy for medical students. The range of group mentorships identified across eight countries suggests a global interest in this approach. While the existing scientific literature on group mentorship is sparse, the supportive evaluation data suggests that it is effective, particularly when the programs are longitudinal and mandatory throughout medical education. Key recommendations include a focus on ensuring program quality through curriculum alignment, support for mentors, and continuous evaluation. Paper II underlines the importance of mentors' satisfaction, highlighting the need for psycho-social rewards and competence in fostering well-functioning group dynamics. Mentors' overall satisfaction seems to be closely linked to them experiencing fulfilling mentor–student relationships and personal and professional development. When mentors enjoy being mentors, it benefits both them and their mentees. Paper III underscores the positive impact of longitudinal group mentorships on medical students' preparedness for clinical practice, specifically regarding patient-centered communication and ethical reflection. By emphasizing the importance of mentorship qualities during medical studies and making mentoring a continuous part of the curriculum, we can foster a culture of mentorship that enhances the practice of medicine and promotes patient-centered care. Overall, these findings advocate for the incorporation of essential elements within group mentoring, such as creating a "safe

space” for reflections, facilitating experience sharing, and providing advice and feedback. As medical education evolves, implementing these insights may increase the effectiveness and sustainability of group mentorships globally, contributing to resilient, empathetic, holistic and patient-centered doctors.

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Paper I

Review Article

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Group mentorship for undergraduate medical students—a systematic review

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Abstract
Introduction Mentoring has become a prevalent educational strategy in medical education, with various aims. Published reviews of mentoring report very little on group-based mentorship programs. The aim of this systematic review was to identify group-based mentorship programs for undergraduate medical students and describe their aims, structures, contents and program evaluations. Based on the findings of this review, the authors provide recommendations for the organization and assessment of such programs.
Methods A systematic review was conducted, according to PRISMA guidelines, and using the databases Ovid MEDLINE, EMBASE, PsycINFO and ERIC up to July 2019. Eight hundred abstracts were retrieved and 20 studies included. Quality assessment of the quantitative studies was done using the Medical Education Research Study Quality Instrument (MERSQI).
Results The 20 included studies describe 17 different group mentorship programs for undergraduate medical students in seven countries. The programs were differently structured and used a variety of methods to achieve aims related to professional development and evaluation approaches. Most of the studies used a single-group cross-sectional design conducted at a single institution. Despite the modest quality, the evaluation data are remarkably supportive of mentoring medical students in groups.
Discussion Group mentoring holds great potential for undergraduate medical education. However, the scientific literature on this genre is sparse. The findings indicate that group mentorship programs benefit from being longitudinal and mandatory. Ideally, they should provide opportunities throughout undergraduate medical education for regular meetings where discussions and personal reflection occur in a supportive environment.

Keywords Mentor · Undergraduate medical students · Professional development · Mentorship program · Systematic review

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Introduction

Mentoring of medical students has become a prevalent educational strategy, particularly in European and North American medical schools, with the purposes of offering support and guidance, providing a fulfilling student experience and stimulating or sustaining professional development [1, 2]. This method is also utilized to increase students' understanding of the competencies required of physicians and the professional roles they are to fulfil [3].

While there are multiple definitions of mentoring [4, 5], we recognize that each has its inherent limitations. Thus we have adopted the following—and frequently cited—operative definition: *"A process whereby an experienced, highly regarded, empathetic person (the mentor) guides another (usually younger) individual (the mentee) in the development and re-examination of their own ideas, learning, and personal and professional development"* [6].

The backdrop for establishing mentorship programs in medical education is a number of well-documented stressors that many students face in their learning environments [7–9], influencing professional identity formation, empathy and patient-centered attitudes in a negative way [10–13]. A 2016 study reported that more than a third of medical students have experienced symptoms of burnout [14]. Curriculum overload, high-stake exams, lack of supervision and absence of emotional support characterize many medical students' daily lives [9, 15]. Measures such as mentorship programs, intended to mitigate these negative influences on students' formation, are warranted. It has been shown that longitudinal and integrated mentoring can improve psychosocial skills and humanistic attitudes, even when assessed 10 years after graduation from medical school [16].

In 2006, Buddeberg-Fischer et al. identified nine mentorship programs in their review on mentoring medical students and doctors [17]. Most of the programs identified were loosely structured and lacked evaluation strategies. Four group-based mentorship programs were included in the review and the mentees in these programs reported high levels of satisfaction [17]. In 2010, Frei et al. reviewed 14 US mentorship programs; two of the programs provided mentoring in small groups. The authors did not draw any specific conclusions about mentoring in groups [1]. In their 2019 review, Tan et al. suggested smaller groups (of approximately five to eight mentees) when the primary focus is on providing personal support, and larger group sizes when the goal is to discuss professional challenges [18].

Recently published reviews of mentoring in medical education have highlighted key advice for schools considering establishing mentorship programs [19, 20]. However, they do not draw explicit conclusions about mentoring in groups. To the best of our knowledge, no reviews specifically targeting group-based mentorship programs for medical students have been published. Hence, there is a knowledge gap with respect to how group mentorships in medicine are organized and evaluated. Group-based mentorships are resource-heavy and time-consuming; thus, it is essential to explore if they are "worth the hassle" and to identify efficient ways such programs can be structured and evaluated.

Our aim was to identify group-based mentorship programs for undergraduate medical students, and describe their aims, structures, contents and program evaluations. Based on our findings and existing literature, we make recommendations for the organization and assessment of such programs. Quality assessment of the quantitative studies was done using the Medical Education Research Study Quality Instrument (MERSQI).

Table 1 Search in Medline

Number	
1	Exp Mentors/
2	Exp Mentoring/
3	(mentor[a] adj3 program[a]).ti
4	(mentor[a] adj3 group[a]).ti
5	(physician adj3 apprenticeship[a]).ti,ab
6	Education, medical/and education, medical, undergraduate/
7	(Medical adj3 student[a]).ti
8	(Medical adj3 undergraduate[a]).ti,ab
9	1 or 2 or 3 or 4 or 5
10	7 or 8 or 9
11	10 and 11

[a]Indicates truncation

Methods

In collaboration with a medical librarian, we conducted systematic searches in the following databases: EMBASE Classic+ (EMBASE 1974 to 2019 July 4), Ovid MEDLINE®, ERIC Database and PsycINFO (to 2019 July 4). The review process was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [21]. Tab. 1 presents the search strategy in Medline and Appendix 1 of the Supplementary Online Material summarizes the complete search strategy.

EPS and UR independently conducted the searches between the 1–4 July 2019. Since this study concentrates explicitly on mentoring in groups designed to foster personal and/or professional development, we excluded mentorships with a primary focus on other issues, such as research supervision or career enhancement. We also excluded the grey literature, as one of our inclusion criteria was peer-reviewed papers listed in scientific databases. Tab. 2 presents the PICO analysis describing the selection process in detail.

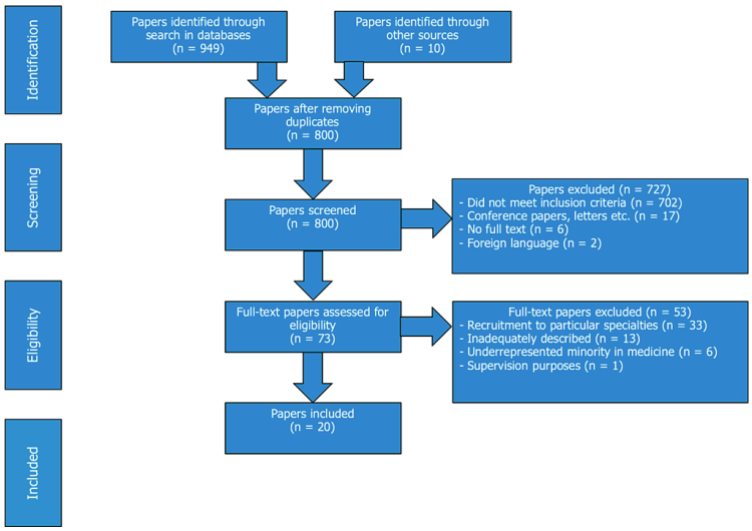
The final search resulted in 949 citations. The authors' own work and knowledge of the literature resulted in 10 additional records; they were included at this stage for further assessment. After removing duplicates, EPS, UR and EHO screened the titles and abstracts of the remaining 800 records. Fig. 1 provides a flow chart of the review process.

EPS extracted data from each of the 20 included studies using a predesigned system, see Appendix 2 of the Electronic Supplementary Material. The main elements extracted from the studies were the programs' primary aims, mentorship structure, information on

Table 2 Selection criteria

	Inclusion	Exclusion
Population	Undergraduate medical students	Graduate and postgraduate medical students, junior doctors, physicians
Intervention	Description of group-based mentorship programs in undergraduate medical education focusing on professional development Evaluation of the mentorship program, either by mentors or mentees or both	One-on-one mentorship Mentorship programs inadequately described, i.e. lacking details on structure, objectives and/or evaluation Programs aimed at recruiting students to particular specialties or field of interests Programs aimed at medical students who need academic supervision or remediation Programs aimed at under-represented minority medical students
Comparison	Comparison of group-based mentorship programs	
Outcome	Outcomes of mentorship programs on the mentor or mentee Evaluation forms and surveys	
Study design	Peer-reviewed papers	Reviews Conference presentations Commentaries Letters Editorials

Fig. 1 Flow chart



participants and evaluation strategies. Quality assessment of the quantitative studies was performed by EPS and EHO using the Medical Education Research Study Quality Instrument (MERSQI) [22]. The MERSQI items are scored on a scale of 1–3 and summarized to a total score of between 5 and 18 for each study.

We utilized Kirkpatrick's four-level evaluation model as a framework for categorizing the evaluation approaches used in the studies. Level 1 describes how the participants reacted to the educational program or training (e.g. satisfaction); level 2 assesses the extent to which the participants have learned (e.g. increased knowledge or skills); level 3 examines whether the participants are utilizing their new knowledge (e.g. changed behaviours) and level 4 assesses if the program has a positive impact on the whole organization [23, 24]. This is summarized in Tab. 3.

Results

The 20 studies included describe 17 different group mentorship programs. Three of the studies describe the "Physician Apprenticeship" program at McGill University in Montreal, while two studies describe the mentoring program at the University of Delhi, which was revised in 2010 and is therefore described in two separate papers.

The studies provided, to a various extent, information about the programs' aims and structure, participants, evaluation and outcomes. MERSQI scores

Table 3 Main elements of the programs

Author	Country	Year established	Mentors	Mentees	Mentor-mentee ratio	Longitudinal program	Mandatory	Evaluation	MERSQI (min 5, max 18)	Kirk-patrick levels[c]
Blatt et al. [25]	USA	–	Physicians and psychosocial professionals	MS-1 to MS-4	1:4–5 (*2:8–9*)	Y	Y	Y	11	1, 2, 4
Lutz et al. [37]	Germany	2013	Faculty members and near-peers	MS-1	1:4–5 (*2:8–9*)	N	N	Y	N/A	1, 2
Andre et al. [26]	USA	2006	Faculty members and MS-4	MS-1 to MS-4	1:11 (*4:44*)	Y	Y	Y	6.5	1, 2
Varma et al. [39]	India	2009	Faculty members	MS-1	1:8–16	–	–	N	N/A	N/A
Kalen et al. [42]	Sweden	2007	Physicians	MS-1 to MS-5	1:4	Y	Y	Y	N/A	1, 2, 3
Duke et al. [27]	USA	2015	Faculty members	MS-3	1:9	N	Y	Y	8	1, 2, 3
Singh et al.[a] [41]	India	2010	Faculty mentors and near-peers	MS-1	1:2 (*2:3*)	N	N	Y	7.5	1, 2
Boudreau et al.[b] [35]	Canada	2005	Physicians and near-peers	MS-1 to MS-4	1:3 (*2:6*)	Y	–	Y	N/A	1, 2, 3
Taylor et al. [28]	USA	2006	MS-2	MS-1	1:4 (*2:8*)	N	Y	Y	8	1, 2
Fleming et al. [29]	USA	2011	Faculty members	MS-1 to MS-4	1:25–28	Y	Y	Y	6.5	1
Bhatia et al. [40]	India	2009	Faculty members	MS-1	1:2–3	N	N	Y	8	1, 2
Goncalves et al. [43]	Brazil	2001	Physicians	MS-1 to MS-6	1:12–14	Y	N	Y	N/A	1
Usmani et al. [44]	Pakistan	2008	Faculty members	MS-1 and MS-2	1:10	N	Y	Y	8	1
Elliott et al. [30]	USA	2001	Faculty members	MS-1 and MS-2	1:12 (*2:24*)	N	Y	Y	6	1, 2
Macaulay et al. [31]	USA	2003	Faculty members	MS-1 to MS-4	1:30	Y	–	Y	6.5	1
Goldstein et al. [32]	USA	2004	Faculty members	MS-1 to MS-4	1:6	Y	Y	Y	N/A	1, 2, 3
Scheckler et al. [33]	USA	1985	Faculty members	MS-1 to MS-4	One mentor per class	Y	–	N	N/A	N/A
Woessner et al. [38]	Germany	1995	Faculty members	MS from different years	1:12	N	N	Y	6	1
					Median 1:9	Yes: 9 No: 9	Yes: 9 No: 5	Yes: 16 No: 2	Mean 7.4 SD 1.44	

MS Medical student; The number following MS denotes the year of the program (e.g. MS-1 refers to a 1st-year medical student)
Y yes, *N* no, – no information
[a]Singh et al. 2010 is the revised version of the mentoring program at the University of Delhi, India, described by Bhatia et al. 2009
[b]Boudreau et al. 2005 is one of three studies identified in the literature search all describing the physician apprenticeship (PA) program at McGill University, Montreal, Canada. Boudreau et al. 2005 describes the program and the assessment of it to such an extent that the two other studies need not be included in the table.
[c]Kirkpatrick levels; Level 1 refers to the level of reaction or feelings by the learners to all factors in an educational program. Level 2 refers to the changes in the learners caused by participation in the program. Level 3 reveals whether or not the program has created a change in the learners' behavior. Level 4 indicates if the program is effective in meeting the organizational goals

ranged from 6 to 11 (mean 7.4, SD 1.44, [$n = 11$]). Tab. 3 summarizes the main elements of the different mentorship programs, including MERSQI and Kirkpatrick assessments. Greater details regarding aims, structure, content and program evaluation are presented in Appendix 3 of the Supplementary Online Material.

In the following section, we present the findings concerning organization and aims of group-based mentorship programs and identified challenges, mentor characteristics, and evaluation strategies and results.

Organization and aims of group mentorship programs

The group mentorship programs identified originate from the USA [25–33], Canada [34–36], Germany [37, 38], India [39–41], Sweden [42], Brazil [43] and Pak-

istan [44]. All programs were initiated after the year 2000, with the exception of the program at the University of Saarland, Germany, established in 1985 [38]. One study did not provide information about the year of establishment [25].

The majority of the programs ($n=9$) were longitudinal throughout the medical curriculum [25, 26, 29, 31–36, 42, 43] whereas four programs were aimed at first year students [28, 37, 40, 41] and one program at third year students [27]. Two programs ran through both the first and second year of medical school [30, 44]. There was a large variation in meeting frequency, ranging from twice a year [42] to 24 times a year [30]; more frequent meetings appeared to correlate with the use of predetermined topics [30] and specified skills training [28, 32]. Participation was compulsory in nine of the programs [25–30, 32, 42, 44]. The mentor-mentee ratio ranged from 1:2 to 1:30, with a median group size of 9 mentees.

Programs aimed at first-year students focused mainly on providing an immediate support network and early introduction to professionalism [28, 40]. Some studies reported addressing specific themes related to professionalism, such as empathy [27, 30], patient-centeredness [34–36], cultural competence, collaboration, ethical decision-making [30], altruism, honor and integrity, communication, respect and accountability [32]. A key feature in several programs was reflective discussions on professional challenges. Topics ranged from discussing positive role models and unprofessional conduct observed in clinical settings [31], ethical dilemmas, conflicts and dealing with stress [37] to career choice, study strategies and how to plan for life as a medical student [26].

The structures established to achieve aims in professional development differed greatly. The two following examples illustrate the variation: the medical students at the Karolinska Institute [42] discussed their own development with their physician mentor, using a self-assessment form based on the CanMEDS framework for the physician's professional roles and competences [45]. Furthermore, each group watched videos focusing on psychological and ethical aspects of physician-patient interactions. In contrast, first-year students at the Alpert Medical School were offered mentoring by second-year students, to foster the students' professional development and skills in medical interviewing and physical examination [28].

Who are the mentors?

Faculty members or experienced physicians acted as mentors in almost all programs [25, 27, 29–33, 38, 39, 42–44]. Some programs provided dual mentoring; frequently, the mentor pair consisted of a faculty member and a senior medical student [26, 35, 37, 41]. One program was based solely on peer-mentoring, with mentors being second-year and mentees first-year students [28].

In some programs [28, 37], the mentors were volunteers. Only four studies [29, 31–33] reported on financial compensation, which ranged from 12,000 USD [33] to 30,000 USD per year [31]. Furthermore, four studies reported on the amount and quality of faculty development for the mentor role, describing that the mentors were invited to workshops [25, 28, 37], seminars [42] and supervisory meetings [43] in order to prepare for group sessions and share experiences with colleagues.

Evaluation strategies and results

All except three programs conducted some form of evaluation. The majority of programs ($n=8$) were evaluated by questionnaires [26, 28–31, 38, 40, 44]: four invited both mentors and mentees to participate [26, 28, 38, 40], one was answered by mentors only [44]. The response rates among mentees varied from 28% [26] to 68% [31]. Three studies conducted interviews to collect data for an evaluation, either individual or in focus groups [37, 42, 43]. Two programs were evaluated using a mixed-method design [25, 35]. Finally, three programs were evaluated using other methods such as qualitative statements from mentors [33], the Groningen Reflection Ability Scale (GRAS) and Jefferson Scale of Empathy (JSE) [27], results from Mini-Clinical Evaluation Exercise (Mini-CEX) and Objective Structured Clinical Examination (OSCE) [32].

Using Kirkpatrick's model of evaluation, most evaluations report findings consistent with level 1 (reaction/satisfaction) and 2 (learning, based on self-reports). Five studies provide information about how the group-based mentorship program induced changes in student behaviour or practices (level 3) or organizational benefits (level 4). The program at the University of Texas San Antonio [26] was the only one to use annual questionnaires for evaluation. The students reported significant year-to-year improvements, and post-hoc analysis showed that the program had increased students' undergraduate medical school satisfaction.

The program at Witten/Herdecke University was evaluated using semi-structured focus group interviews with students and semi-structured individual interviews with mentors and co-mentors. Some students did not seem to perceive any positive outcomes on their professional development or understand why improving their performance as physicians was connected to their abilities to reflect on and discuss personal and professional challenges. Other students mentioned improved abilities to partake in discussions of a reflective nature, thus enhancing the comprehension of themselves and others [37].

The Physician Apprenticeship at McGill University was evaluated by conducting a longitudinal, mixed-methods study. The design was a case study, consisting of three physician apprenticeship groups (a total

of 24 medical students and three mentors) followed over four years. The authors concluded that a long-term mentoring program can contribute to building and maintaining a professional identity among medical students and to reaffirming the professional identity of mentors [34–36].

The program established at Drexel University is one of the few that evaluated its effects on students' competence. Students were assessed before and after the program by mapping their abilities to engage in self-reflection and perceived empathy using the Groningen Reflection Ability Scale (GRAS) and Jefferson Scale of Empathy (JSE). The program increased students' reflection abilities and may have contributed to the preservation of empathy. GRAS scores increased significantly ($p < 0.001$) in both genders, while JSE scores were unchanged [27].

Overall, most of the studies reported positive effects of group mentoring. Students highlighted increased personal and social support [30, 31, 33, 35], improved student satisfaction and professional growth [26, 29, 30]. Mentors reported personal and professional gain [35, 37, 44], increased skills in communication and feedback [40] and felt gratified to see the students develop professionally [35, 37, 38, 44].

Challenges for group-based mentorship programs

Some of the studies described barriers to well-functioning mentoring. In evaluating the mentorship program at Sao Paolo University in Brazil, many mentors expressed frustration because of the students' low attendance or absence. Furthermore, they experienced doubt in dealing with the initial expectations about the mentoring role [43]. Both at Bahria University in Pakistan [44] and Sao Paulo University [43], some of the mentors felt burdened at times as mentoring was an additional and time-consuming assignment. The students identified various impediments to positive interpersonal communication, including lack of reliability, breaking confidentiality rules and disrespect in the groups.

At the University of Delhi, about one third of the mentorship groups never met during the academic year, mentees were often reluctant to contact the mentors, and finding the appropriate time for all parties was described as a common challenge [40]. Various other barriers were reported, including: technology issues, logistics, a lack of 'personal chemistry' in the group and time constraints [27].

Discussion and recommendations

Our systematic review reports on the nature of group-based mentorships in medical schools located in seven different countries. The programs included in this review had similar overall aims (personal and professional development and student support). However, we found large variations in the way they were organized. This may reflect differing interpretations of professionalism among universities and suggests that there are several ways to foster professional development.

Table 4 Recommended features for mentorship programs

The mentorship program should be longitudinal throughout the medical education
Mentorship activities should be designed to align with the overall curriculum
The program should be mandatory
Mentors should be (experienced) physicians, either alone or in pairs, and may be accompanied by a student mentor
A small financial reward or promotion for mentors may reduce "wear and tear"
Mentors should be empowered by introductory courses, frequent mentor gatherings or workshops and faculty support

A key element of transformative learning in professional development is partaking in reflective discussions with others [46]. Medicine is teamwork, hence communication skills and reflective discourses in group settings are essential parts of being a physician. Whilst the intimacy of one-on-one mentoring may facilitate coaching on the personal aspects and unique vulnerabilities of an individual student's educational experience, a group setting can provide a framework that offers rich possibilities for relationship building. This format provides an avenue for peers of varied backgrounds and resources to share experiences and to reflect on social interactions and relational skills [47].

In the following discussion, we draw upon the institutions' experiences with group-based mentoring, as presented in the 20 studies, and explore the essential factors for well-functioning group mentorship programs. The majority of the studies provided sufficient information on mentorship structures and evaluation strategies and have permitted us to propose a set of recommendations for group-mentorship programs. These are presented in Tab. 4.

Optimal organizational features

Most of the identified programs were longitudinal. Assessment of one of the shorter programs reported that both mentees and mentors wished their program were longer in duration [38]. The students at the Witten/Herdecke University stated that integrating the group mentoring into the entire curriculum (i.e. longitudinal program) was seen as "essential in experiencing the relevance of reflection" [37]. In a longitudinal program, the mentoring relationship can evolve over several years, hence it can facilitate openness and reflective discourses. Moreover, group dynamics may take time to establish and require investment in a trustworthy learning environment. We therefore suggest that longitudinal group mentorship programs

focusing on professional development are preferable to shorter programs limited to a single or a few years.

We found large variation in meeting frequency, and more frequent meetings appeared to be correlated with groups having predetermined topics [30] and skills training [28, 32]. We propose a minimum of two meetings per semester, with higher meeting frequencies both in the beginning of medical school and during clinical rotations. This has been shown to be important in providing an immediate network of safety and support and to debrief students' clinical and emotional experiences [15].

Recent studies propose that mentorship activities should be designed to fit the overall curriculum [18, 20]. If a mentorship program is loosely attached to other teaching and learning activities, it may become a competing activity that can be easily ignored. Mandatory attendance might be one mechanism to meet this challenge. A frequent complaint from mentors was that mentees did not attend the groups consistently in voluntary programs [40, 43].

Mandatory group meetings not only ensure mentee participation, it also signals the importance of group mentoring as a meaningful part of the curriculum. In fact, none of the programs in this review reported that a mandatory approach was considered negative. Based on our findings, a mandatory approach to group mentorship seems preferable. It is important, however, that compulsory teaching activities are adequately resourced and continuously evaluated to ensure a high standard [20].

Who should mentor medical students in groups?

The majority of the studies reported that either physicians or faculty members fill the roles of mentors. If the mentorship aim is to foster professionalism, it may be reasonable to recommend experienced physicians over near-peer mentoring by medical students. However, our findings indicate that a combination of a physician mentor assisted by a senior student can work really well [26, 35, 37]. In evaluating the revised program at the University of Delhi [40], nearly all faculty mentors and mentees appreciated the contributions of the co-mentors [41]. The involvement of experienced student mentors can be preferable as it will maintain desirable mentor-mentee ratios, especially in medical schools with large classes where it may be difficult to recruit enough physician mentors.

With regards to incentives for mentors, our findings do not indicate that they are essential to motivate mentors. For instance, the group mentorship program at the University of Saarland is described as well-functioning and popular with both mentees and mentors, even without faculty support, incentives and mandatory participation [38]. However, for the recruitment and sustainability of a motivated mentor force, a small financial reward or promotion may reduce "wear and tear".

Nimmons et al. recommended that mentors should receive guidance in the requirements of the role and in delivering effective feedback to mentees [20]. Faculty development and administrative support to mentors in one of the identified programs was described as a key element [26]. Many mentors at Sao Paolo University experienced doubt concerning the expectations of the mentor role and its tasks [43]. We suggest an approach to empower group mentors: firstly, every mentor should participate in an introductory workshop where the program aims and methods to achieve these aims are emphasized [28, 37, 42, 43]. Secondly, mentors should have the possibility to attend frequent mentor gatherings to facilitate debriefing and reflective discussions [42, 43].

Program evaluation

In evaluations using a quantitative design, the response rates varied considerably. Low response rates (<50%) increase the risk of selection bias and hamper external validity, which was the case in some studies [26, 27], while response rates were not reported in others [29, 30, 38]. One of the programs used the four-level Kirkpatrick model for evaluation [25]. Only a few studies reported on barriers to well-functioning mentoring; there is a need to address such challenges in future studies.

The two most informative evaluations were both conducted using mixed methods [25, 35]. Mixed-methods design may be advisable for researchers who want to describe and assess group mentorship programs in the future, in order to collect comprehensive data. Additionally, case-studies as described in some of the included studies [27, 37] can be recommended as an approach to provide more in-depth knowledge concerning educational strategies [48].

Limitations

A significant limitation of this study is the variety of approaches used to evaluate the mentorship programs. Lack of uniform terminology and diverse evaluation strategies, especially non-validated methods of assessment, makes it challenging to compare outcomes of mentorship programs [49]. There is a need for more research-based evaluation designs of group mentorship programs, particularly to learn more about the effects of programs at Kirkpatrick's level 3 and 4.

The studies assessed with MERSQI in this review ranged from 6 to 11 (mean 7.4, SD 1.44, $n=11$). Most of the studies used a single-group cross-sectional design conducted at a single institution, hence yielding a low score. Furthermore, none of the studies reported validity of evaluation instruments. This, combined with low or non-reported response rates, resulted in mostly low MERSQI scores for studies using quantita-

tive assessments. This makes it difficult to draw robust conclusions from most of the identified studies.

Given our decision not to include the grey literature, we may not have benefited from the experience of group mentorships that have been implemented but not reported on in the peer-reviewed literature. Future studies should consider performing an adjuvant search in the grey literature.

Our findings indicate that the establishment of mentorship programs for medical students, including group-based programs, is a trend worldwide. However, when considering the absolute number of medical schools, particularly in continental countries, there is reason to believe that the 17 group-based programs identified in this review represent a small percentage of existing programs.

Conclusion

Group mentoring as an educational strategy for medical students holds great potential. We identified 17 different mentorship programs in seven countries, and the evaluation data are remarkably supportive of mentoring medical students in groups. However, the scientific literature on this emergent genre is sparse and the quality of publications is modest. Our findings indicate that group mentorship programs benefit from being longitudinal and mandatory throughout undergraduate medical school, and that mentorship organizers must pay close attention to ensuring the quality of the program through curriculum alignment, the support of mentors and continuous evaluation to keep the program on track.

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Paper II

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What makes mentors thrive? An exploratory study of their satisfaction in undergraduate medical education

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Abstract

Background Mentoring medical students with varied backgrounds and individual needs can be challenging. Mentors' satisfaction is likely to be important for the quality and sustainability of mentorships, especially in programs where the mentor has responsibility for facilitating a group of mentees. However, little is known about what influences mentors' satisfaction. The aim of this study was to measure mentors' self-reported satisfaction with the mentoring experience and to explore associations between satisfaction and its putative factors.

Methods An online survey was sent out to all physician mentors in each of the three mentorship programs (UiT The Arctic University of Norway, the University of Bergen, and McGill University, graduation years 2013–2020, $n = 461$). Data were analyzed by descriptive statistics, dimension reduction, and linear regression.

Results On a scale from 1 to 5, mean mentor satisfaction score at two Norwegian and one Canadian medical school was 4.55 (95% CI 4.47, 4.64). In a multilevel multivariate regression analysis, two predictors were significantly associated with mentors' satisfaction: (1) the perception that students found the group meetings valuable ($\beta = 0.186$, 95% CI 0.021, 0.351, $p = 0.027$) and (2) mentors' perceived rewards ($\beta = 0.330$, 95% CI 0.224, 0.437, $p < 0.001$). Perceived rewards included experiencing gratifying relationships with students, and mentors' perception of self-development.

Conclusions In this study, mentors appeared to be highly satisfied with their mentoring functions. Our findings suggest that mentors' overall satisfaction is closely linked to their experiences of fulfilling mentor-student relationships and personal and professional development. Interestingly, and perhaps contrary to commonly held assumptions, we found no association between mentor satisfaction and financial compensation. Furthermore, satisfaction was not associated with the provision of pre-assigned topics for discussions for mentor group meetings. We propose that the mentors' experienced psycho-social rewards, and their competence in establishing well-functioning group dynamics, should be areas of focus for faculty development.

Keywords Mentoring, Group mentorship, Medical education, Satisfaction, Rewards

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Background

Mentoring, notably in formats where mentors are given responsibilities for a group of mentees, is increasingly used in medical education [1]. Mentorships offer rich opportunities for building relationships, professional identity formation, and for the promotion of reflection [2–4]. Such outcomes are favored through the nurturing of shared goals, and in psychologically safe contexts where students and mentors have diverse backgrounds and experiences [1, 5]. Mentoring medical students in groups may also be an effective way of making mentoring available to a large number of students [6].

Several studies assessing mentorship programs, mostly one-on-one, have found that students report positive effects, e.g. increased personal support [7–9], professional growth and improved satisfaction with the medical education experience [1, 7, 10–13]. Mentors have been shown to benefit as well, through enhanced personal development [14, 15] and improved clinical skills, such as listening and communication [11].

Desirable mentor characteristics are described in the medical literature [6, 16–19]. Mentors should be active listeners. They must engage in and understand messages that are not explicitly communicated (e.g. body language, facial expressions) [16]. Student-centeredness and a willingness to develop both personally and professionally are other desirable mentor qualities [16, 17]. A good mentor has been described as enthusiastic, selfless, and knowledgeable [17, 20].

Mentors in medical education are often clinicians or medical teachers who adopt the role with minimal preparation or training in mentoring and small group facilitation [3, 21]. Being a mentor for a group of students with varied backgrounds and individual needs can be challenging [22, 23]. One of the key impediments to the establishment of well-functioning mentorship groups is uncertainty on the part of mentors regarding the nature and goals of their role [1]. Mentors thus need clearly defined expectations of mentoring, and support in developing listening and feedback skills [24].

There is a gap in the literature as to which factors are associated with mentors' satisfaction in group-based programs. The purpose of our research was, using a survey instrument, to measure mentors' self-reported satisfaction with the mentoring experience and to explore associations between satisfaction and its putative factors. Mentors' satisfaction may be decisive for the pedagogical quality and the sustainability of group mentorship programs in medical education [13, 25].

Methods

Context

The present study is part of a larger multi-center research project (called CanNorMent), a collaborative investigation of group mentorship programs at three medical schools: UiT the Arctic University of Norway (UiT), the University of Bergen (UiB), Norway, and McGill University, Canada.

They are all longitudinal and mandatory mentorships in which pairs of mentors facilitate discussions within a group of medical students. The programs share a focus on establishing a safe environment where students, in dialogue with peers and mentors, can: (1) share thoughts and discuss the challenging experiences and processes of medical studies that may contribute to professional identity formation, and (2) reflect on patient encounters and the goals of medicine. The characteristics of the three group mentorship programs are summarized in Table 1.

Survey instrument and participants

The survey categories, items and responses are presented in Appendix 1. At the time of the study, we were not able to find a validated questionnaire suitable for our research question. Consequently, with inspiration from Stenfors' research [5] and Prosser and Trigwells' approaches to a teaching inventory adapted to mentoring [26], we developed a survey using a combination of closed ($n=28$) and open-ended questions ($n=8$). The language was English. It was pilot tested on three mentors in both Canada and Norway, which led to minor adjustments of some questions. The mentor pairs at UiT and UiB were both physicians, whereas mentor pairs at McGill consisted of a physician with a senior medical student as co-mentor. Thus, the questions regarding co-mentorship were different in the Norwegian and Canadian surveys.

All physician mentors who had participated in each of the mentorship programs (graduation years 2013–2020, $n=461$) were invited to participate. No incentives were offered. The study population at each site was as follows: 114 mentors at UiT; 123 at UiB; and 224 at McGill. Since mentors at McGill accounted for approximately 50% of the responses, a chi-square test was conducted after dichotomizing the outcome variable. The distribution of the outcome did not significantly differ by university ((χ^2 (2, $N=272$) = 1.78, $p=0.41$)), thus it was appropriate to aggregate the responses from all the participants. As the survey aimed to map specific topics concerning group mentoring, some survey items were not relevant for the aim of this specific paper and hence are not discussed here.

Table 1 Characteristics of the three mentorship programs (at the time of the study)

	McGill University, Canada	University of Bergen, Norway	UiT The Arctic University, Norway
Duration of medical school	4 years	6 years	6 years
Students per year	180	150	100
Mentor program	MS1-MS4	MS2-MS5	MS1-MS4 and MS6
Mentor program established	2005	2014	2012
Group size	6 students	8 students	8 students
Meetings	4–8 meetings a year. Attendance at 75% of meetings is compulsory.	5 meetings a year. Attendance at 75% of meetings is compulsory.	4 meetings a year + 1 one-on-one meeting (30 min). Attendance at 75% of meetings is compulsory.
Mentors	1 physician and 1 senior (MS3 or MS4) student.	2 physicians.	2 physicians.
Content emphasis	The content is driven by the students' preferences. Mentors have backup content if needed.	The content is driven by the students' preferences. Mentors are oriented about person-centred medicine and medical professionalism.	Every group meeting has a predetermined topic and students prepares tasks to present and discuss.
Criteria for mentor recruitment	Recruit mentors from all the specialties in medicine; approximately 1/3 are from the Department of Family Medicine. Strives to recruit mentors who are seeing patients in their daily work.	Recruit mentors through informal networks and snowballing techniques. Recruitment is purposely seeking to enroll physicians and pairing mentors with the aim of maximum variation.	Head of institutes recruit mentors. Both mentors must be physicians by education; otherwise, there are no criteria for being a mentor.
Faculty development	3 workshops per year.	One introductory seminar and 2–3 annual seminars.	One introductory seminar and one annual seminar.
Additional financial compensation	Yes.	Yes.	No.

The number following MS denotes the year of the program (e.g., MS-1 refers to a 1st-year medical student)

MS Medical student

The study was approved by the Institutional Review Board at McGill University (Study Number A03-B16-17B) and the Norwegian Centre for Research Data (ID 53,715). The survey was distributed by e-mail to the mentors using the platform SurveyXact, with two reminders. Responses were stored on a high-security server at UiB where all analyses were carried out on encrypted files, with personal information (name and e-mail address) detached.

Statistics

In this study, the primary outcome variable was mentors' satisfaction, derived from the question "If you consider the totality of your experience of being a mentor, how do you like it?". The responses ranged from 'I dislike being a mentor'=1 to 'I like being a mentor'=5. Statistical analyses were performed using IBM SPSS version 29. Descriptive statistics were conducted for respondents' characteristics and several of the questions in the core survey instrument, including means and distributions.

Factor analyses

The respondents rated their agreement with nine statements describing how they approached group mentoring. The respondents also rated their agreement with seven items of rewards from mentoring and three items regarding their perception of student resistance in the groups. Several of the items in each of these categories ("Mentoring approach", "Rewards", and "Student resistance", see Appendix 1) were highly intercorrelated, thus factor analyses (dimensional reduction; varimax rotated) were used to develop indices that could be used as independent variables in the analyses of mentors' satisfaction. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy along with Bartlett's test of sphericity were performed to decide the appropriateness of the factor analyses [27, 28]. For details regarding items and factor loadings in the exploratory analyses, see Appendix 2.

For the mentors' approach to group mentoring (KMO = 0.75), an exploratory factor analysis was conducted, after which three of the items were removed due to low loadings on the first factor. A confirmatory factor analysis of the six remaining items yielded one factor with eigenvalue larger than 1, explaining 44.1% of the variance (Cronbach's $\alpha = 0.77$). The index was labeled 'Engaging mentoring approach'.

For the group of reward items (KMO = 0.81), one item concerning financial rewards was removed due to minimal loading to the first factor in an exploratory factor analysis. The confirmatory analysis of the remaining six items lead to a factor explaining 58.8% of the variance (Cronbach's $\alpha = 0.84$). This index was labeled 'Perceived mentoring rewards'.

Lastly, a factor analysis was done on the three items regarding mentors' perception of student resistance in the groups (KMO = 0.61). In this case, only one factor was extracted, explaining 61.1% of the variance (Cronbach's $\alpha = 0.67$). This index was labeled 'Perceived student resistance'.

Multilevel linear regression

As this was a multi-institutional study, there was a need to explore if and how context affected the findings. Mentors' experiences may be shaped by the social context in which they occur. Multilevel modelling provides a framework to account for such complex data structures [29]. Consequently, a multilevel multivariate linear analysis was completed to explore the association between the primary outcome and the level one (individual) and level two (university) predictors. The intraclass correlation coefficient (ICC) [30] with mentors' satisfaction as a dependent variable and universities as random intercept was 0.034. The design effect (DEFF) was above the criteria of 2, indicating a need for multilevel modelling [29].

First, a multilevel univariate linear regression analysis was performed with each of sixteen predictor variables and mentors' satisfaction as the dependent variable (Table 2). Second, only statistically significant predictors were included in the final multilevel multivariate linear regression analysis, in addition to age and gender. The significance threshold for the regression analyses was set at 5% ($p < 0.05$). A stepwise regression method was used to fit the final model. Prior to modelling, the Variance Inflation Factor (VIF) [31] was utilized to explore multicollinearity. This test indicated that predictor multicollinearity was not a problem (VIF mean = 1.672).

Results

The characteristics of the mentors are summarized in Table 3. The overall response rate was 59% ($n = 272/461$). 117 mentors were female (43%) and 153 were male (57%). The percentage of female mentors was higher at McGill and UiB than at UiT (45% and 49% versus 32%, respectively). The mentors were categorized into four groups by age: <40 years (21%), 40–49 years (28%), 50–59 years (23%) and >=60 years (28%). At McGill and UiB, a larger percentage of mentors were below 50 years of age than at UiT (51% and 38% versus 13%, respectively). Most of the mentors responded that their nature of work was mostly clinical (69%), while a minority had some or no clinical responsibilities (21% and 10%, respectively).

Responses to the following set of questions in the survey instrument are presented in Table 4: mentors' satisfaction, questions addressing the mentors' approach to group mentoring and questions regarding rewards. The distribution of mentors' satisfaction was skewed towards

Table 2 Predictor variables for Mentor's satisfaction; on University level (Level 2) and Mentor level (Level 1) by univariate multilevel linear regression analysis

	Category	Items - questions in questionnaire or results of factor analysis	β	*P*-value*	95% CI
Level 2 predictors	Mentor recruitment	Did you volunteer to become a mentor, or is it mandatory in your job?	-0.211	0.008**	[-0.367,-0.055]
	Structured meetings	Based on information on the three programs	0.056	0.299	[-0.049,0.158]
	Additional financial compensation	Based on information on the three programs	0.056	0.299	[-0.049,0.158]
Level 1 predictors	Mentor characteristics	Age	0.008	0.487	[-0.049,0.102]
		Gender	0.002	0.908	[-0.161,0.181]
		What is the nature of your current work?	-0.013	0.600	[-0.161,0.093]
		For how many years, in total, have you been a mentor of medical students?	0.012	0.023**	[0.002,0.026]
	Mentor support	I find it unclear what the mentor program's expectations are	0.185	< 0.001**	[-0.260,-0.110]
		I find it difficult to fulfil the program's expectations	0.184	< 0.001**	[-0.269,-0.107]
		What is your opinion about the quality of the training provided, including workshops and information meetings, to help mentors?	0.247	< 0.001**	[0.148,0.342]
		What is your opinion about the quality of the written material on mentoring and the mentor program, provided to you as a mentor?	0.187	< 0.001**	[0.081,0.289]
	Student perspective	The students seem to find the group meetings valuable	0.466	< 0.001**	[0.351,0.580]
		The students in my group have lots of ideas for the group process and discussions	0.259	< 0.001**	[0.180,0.338]
	'Engaging mentoring approach'	Factor containing six items that illustrates an engaging way to be a mentor	0.228	< 0.001**	[0.148, 0.310]
	'Perceived rewards'	Factor containing six items that illustrates potential rewards of being a mentor	0.428	< 0.001**	[0.330, 0.473]
	'Perceived student resistance'	Factor containing three items that illustrates students' resistance in the groups	-0.238	< 0.001**	[-0.331,-0.144]

**P*-value in the univariate analyses

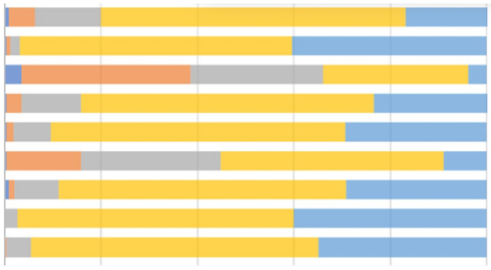
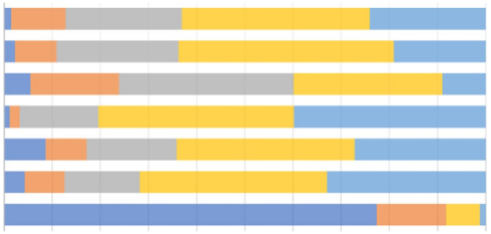
***Significant at $p < 0.05$

Table 3 Mentors' characteristics

		McGill University, Canada	UiB, Norway	UiT, Norway	Total
Characteristics[a]					
Responders, n (% of invited)		137 (61)	75 (61)	60 (53)	272 (59)
Gender, %	Female	45	49	32	43
	Male	54	51	68	57
Age (years), %	< 40	13	40	12	21
	40–49	38	23	13	28
	50–59	20	19	33	23
	60+	28	18	42	28
Nature of work, %	Mostly clinical	85	67	33	69
	Some clinical	13	18	45	21
	No clinical	1	14	17	10

[a] Two participants did not answer any of these questions regarding characteristics

Table 4 Mentors' satisfaction, Mentoring Approach and Reward Items, distribution of Likert scale responses. Horizontal bars: Likert score 1; (strongly disagree) dark blue, 2; orange, 3; grey, 4; yellow, 5; (strongly agree) light blue

Survey item	Mean	Distribution of responses across 1–5 Likert scale
Mentors' satisfaction: If you consider the totality of your experience of being a mentor, how do you like it?	4.55	
Mentoring approach		
As a mentor I:		
- Answer questions and provide knowledge	3.90	
♦ Share what it means to be a doctor	4.36	
- Listen to students without offering advice	2.96	
♦ Stimulate collaboration and relationships within the group	4.04	
♦ Am a role model for the students	4.17	
- Provide career counselling	3.48	
♦ Take an interest in students' personal development	4.15	
♦ Share my experiences of doubt and uncertainty	4.29	
♦ Share my attitudes and judgments concerning values and dilemmas in medicine	3.35	
Rewards		
* Being a mentor has helped me become better at what I do professionally	3.73	
* I learn a lot from discussing with students	3.70	
* The preparation offered to all mentors gives me new knowledge	3.20	
* The relationships with the students are gratifying	4.16	
* Mentoring makes me more proud of being a physician	3.66	
* Mentoring allows me to explore what it means to be a "good doctor"	3.88	
- Mentoring provides financial rewards	1.32	

♦= Items representing result from factor analysis: 'Engaging mentoring approach'

*= Items representing result from factor analysis: 'Perceived Rewards'

positive assessment; mean score across the universities was 4.55 (95% CI 4.47, 4.64). The two highest scores among the questions regarding mentors' approach to mentoring, were "sharing what it means to be a doctor" (mean 4.36, 95% CI 4.28, 4.43) and "sharing experiences of doubt and uncertainty" (mean 4.29, 95% CI 4.31, 4.44).

The 'Engaging mentoring approach' index represents a summary of the items where the respondents express their approach to mentoring. Six of these items are correlated, so that they to a large extent show aspects of the same approach or attitude. Therefore, it is appropriate to use a common index for the mentoring approach, as it is described in the statistics section. The index thus illustrates mentoring approaches related to sharing of experiences, attitudes and meaning, role modelling, group facilitation (stimulate collaboration and reflection) and taking an interest in students. The 'Perceived mentoring rewards' index addresses the mentors' perception of professional and personal development and gratification. See Table 4 for details on which items represents 'Engaging mentoring approach' and 'Perceived mentoring rewards.' The 'Perceived student resistance' index represents mentors' degree of insecurity related to whether students find the meetings meaningful, and mentors' being disturbed if students appeared to be bored during the group meetings. Appendix 2 shows further details regarding the items included in each index.

All three indices were significantly associated with mentors' satisfaction in the multilevel univariate linear analyses. See Table 2 for an overview of all predictor variables and p-values. Mentors who scored higher with regards to 'Engaging mentoring approach' and 'Perceived rewards of mentoring', were likely to score higher on satisfaction ($\beta = 0.228$, 95% CI 0.148, 0.310, and $\beta = 0.428$,

95% CI 0.330, 0.473, respectively). Furthermore, mentors who experienced lower levels of student resistance were likely to score higher with regards to satisfaction (β = -0.223, 95% CI -0.419, -0.240).

In addition to the three indices, the univariate analysis revealed that eight additional predictors were significantly associated with mentors' satisfaction. These eight predictors were: how the mentors were recruited (voluntarily), years of experience as a mentor, items regarding mentor support (whether the expectations of the program were unclear or difficult to fulfil, and the mentors' opinion about the quality of the mentor training and written material provided), and questions regarding students' appreciation of the group meetings (if the mentors experienced that the students were enthusiastic and found the meetings valuable).

The results from the multilevel multivariate regression analysis are presented in Table 5. In this final model, after adjusting for all the variables mentioned, only two predictors remained significantly associated with mentors' satisfaction: (1) the perception that the students found the group meetings valuable (β = 0.186, 95% CI 0.021, 0.351, $p = 0.027$) and (2) that the mentors experienced rewards of mentoring (β = 0.330, 95% CI 0.224, 0.437, $p < 0.001$). The 'Perceived rewards' index was the strongest predictor for mentors' satisfaction both in the uni- and multivariate analyses.

Discussion

In the present study, group mentors at two Norwegian and one Canadian medical school seemed to be highly satisfied with their mentoring function in general. High satisfaction levels were significantly associated with mentors' perceived rewards and their belief that students seemed to find the group meetings worthwhile.

Previous studies have shown that mentors value personal rewards such as an enhanced insight in the students' thoughts and professional progress, as well as their own development [14, 32, 33]. This is aligned with the findings of this study; mentors who experience personal development, as well as gratifying relationships with the students, seem to be more satisfied in their role. Such "non-materialistic" rewards may be of higher importance for mentors' satisfaction than pecuniary rewards, as we did not find any association between satisfaction and receiving additional financial compensation. Some well-known theories of satisfaction and motivation emphasize the impact of non-financial rewards, such as Self-Determination Theory (SDT). It suggests that intrinsic motivators such as autonomy, competence, and relatedness are crucial for enhancing intrinsic motivation, leading to higher satisfaction [34]. Financial incentives may be used to decrease "wear and tear", though it seems not to be essential for mentors' satisfaction [1, 13].

Table 5 Associations between mentors' satisfaction and predictor variables by multivariate multilevel linear regression analysis Dependent variable: Mentors' satisfaction, derived from the question "If you consider the totality of your experience of being a mentor, how do you like it?"

Mentor characteristic or questionnaire item	Responses	β	*P*-value	95% CI
Intercept		3.950	< 0.001	[2.988, 4.911]
Age		9.813E-6	1.000	[0.080, 0.080]
Gender	Female = 1, Male = 2	0.134	0.115	[-0.033, 0.301]
Whether the mentors were recruited voluntarily or mandatory	1: I volunteered, 2: I was strongly urged, 3: It is mandatory in my job	-0.048	0.517	[-0.194, 0.098]
Years of experience as a mentor	0: <5 years, 1: 5–9 years, 2: =>10 years	0.003	0.948	[-0.103, 0.110]
The program's expectations are unclear	1: Strongly disagree to 5: Strongly agree	-0.046	0.381	[-0.150, 0.058]
It is difficult to fulfil the program's expectations	1: Strongly disagree to 5: Strongly agree	-0.042	0.408	[-0.143, 0.058]
Opinion about the quality of training provided to mentors	1: Very poor to 5: Very good	-0.003	0.971	[-0.145, 0.140]
Opinion about the quality of the written material provided to mentors	1: Very poor to 5: Very good	-0.085	0.225	[-0.224, 0.053]
The students seem to find the group meetings valuable*	1: Strongly disagree to 5: Strongly agree	0.186	0.027	[0.021, 0.351]
The students have lots of ideas for group discussions	1: Strongly disagree to 5: Strongly agree	0.037	0.436	[-0.056, 0.130]
'Engaging mentor approach'	Factor containing six items that illustrates an engaging way to be a mentor	0.036	0.450	[-0.058, 0.129]
'Perceived rewards'*	Factor containing six items that highlight potential rewards of being a mentor	0.330	< 0.001	[0.224, 0.437]
'Perceived student resistance'	Factor containing three items that describe students' resistance in the groups	-0.063	0.240	[-0.169, 0.043]

*$p < 0.05$

Previous studies on mentorships in medical education have suggested that learning activities should be highly structured and aligned with the overall curriculum [1, 3, 35]. In the current study, it is noteworthy that the design varied across the three schools. At UiT, every group meeting has predetermined topics with which mentors and mentees are expected to become acquainted and to discuss. This was in contrast with McGill University and UiB, where the meeting agenda was driven by students' needs and interests and where preassigned content was relegated to a 'back-up' status. Interestingly, we found no significant association between group structuring and mentors' satisfaction.

Mentors have an important facilitator role in group settings in that they encourage the mentees to share their personal and professional experiences in a safe environment [1, 19]. Some studies suggest that mentors with a more directive approach, one where the mentor responds to questions rather than fostering discussions in the group, may lead mentees to take on a passive role as spectators [5, 36]. This may impede reflective dialogues and professional development of both the mentors and mentees [1, 36]. As our findings suggest, it is likely that mentors feel more gratified if they experience that students are enthusiastic and find the group useful.

We created an index, representing mentors who perceive themselves as sharing, serving as role models and being group-oriented, and was inspired by previous research that attempted to describe desirable mentor approaches [6, 16, 18]. Somewhat surprisingly, in the multivariate analyses, we found no significant association between the 'Engaging mentoring approach' and mentors' satisfaction. In contrast to previous studies, our findings suggest that whether mentors are satisfied in their role or not, is less dependent on their specific approach and more related to the group dynamics itself, as well as the mentors' perceived rewards in their role.

Our findings have implications for our understanding of what might motivate mentors and thus how to sustain mentorship programs. We suggest that faculty development should focus on mentors' experienced psycho-social rewards, as well as on strategies to establish competence in establishing well-functioning group dynamics. A recent review proposed that it is essential for mentors to undergo training that covers their role's obligations [3]. Based on our study, there is reason to believe that by guiding mentors in group facilitation, relationships may be improved, ultimately leading to greater mentor satisfaction.

The findings of this study may not be surprising because 'satisfaction' and 'rewards' (regardless of their nature) are likely to be intertwined. However, it has clarified the situation. Financial rewards were not salient. To our knowledge, this is the first study to explore several predictors of group mentors' satisfaction, while simultaneously controlling for socio-demographic variables and university-level effects.

Study limitations

Although there are inherent limitations, the study has several strengths. We conducted it at three universities in two countries, where mentorship programs have been established for several years. Despite some differences (e.g. the methods for mentor recruitment, the organization of group meetings), this multi-centered study has provided a comprehensive overview of mentors' experiences. The survey had acceptable response rates, and the panel of questions has given us the opportunity to show associations between the mentors' level of satisfaction and several influential factors.

However, the findings should be interpreted considering certain limitations. As this was a cross-sectional study, we cannot use these data to infer causality [37]. The mentors' responses were potentially influenced by additional factors that the survey instrument was not designed to explore in depth, such as the nature and content of faculty development, administration, and logistics, and the material or symbolic rewards or inconveniences of being a mentor. Another limitation is the fact that survey respondents may have been more positive about their mentoring role than non-respondents, from whom we have no information. Although some of the data were not continuous and showed a skewed distribution, we chose to analyze data with parametric methods. Several studies have shown that results of parametric analyses are robust and minimally sensitive to violations of assumptions of normality and type of scale [38, 39].

Future research should attempt to further explore the mentors' perceptions of what constitutes well-functioning mentoring groups, as this seems to be important for mentors' satisfaction. It should include prospective longitudinal studies, ideally multi-institutional, that examine the influence of group mentoring features on both mentors' and mentees satisfaction on a long-term basis. Also, it would be valuable to study the extent of alignment between mentors' and students' perception on this matter.

Conclusion

Functioning as a mentor for groups of medical students is seen as a satisfying and rewarding educational role. The findings of this study indicate that for group mentors' overall satisfaction, it is highly important that they experience rewards including personal and professional development and gratifying relationships with the students. We propose that the mentors'

experienced psycho-social rewards, as well as competence in establishing well-functioning group dynamics, should be areas for faculty development. Guiding mentors in their roles as group facilitators may lead to improved relationships within their groups, which could potentially lead to greater mentor satisfaction and improved pedagogical quality of the group mentorship program.

Supplementary Information

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Supplementary Material 1.

Supplementary Material 2.

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Authors' contributions
EPS wrote the main manuscript text. ES, JDB, AT, UR, AF, MK, EHO reviewed and edited the text. EPS, UR, JDB and ES prepared figures and tables. EPS, UR and AT completed the statistical analyses. All authors have read and approved the final manuscript.

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Availability of data and materials
Details regarding the survey sections and questions can be found in Appendix 1.

Declarations

Ethics approval and consent to participate
Informed consent was obtained from all subjects. The core survey instrument did not ask for any information that could identify the participant. All participants were informed of their right to decline to answer any question and that they have the right to withdraw from the study at any time. Withdrawal would have no consequences on the participant. The study was approved by the Institutional Review Board at McGill University (Study Number A03-B16-17B) and the Norwegian Centre for Research Data (ID 53715).

Consent for publication
Not applicable.

Competing interests
Yes. JDB, ES, EHO and UR are/have been leaders of the group mentorship programs at the three universities. Besides that, all authors report no competing interests.

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Publisher's Note

Paper III

Article title: Attitudes of medical students towards communication skills and patient-centered care: the impact of group mentorship

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Abstract

Objectives: To explore medical students' self-assessed preparedness for clinical practice and attitudes towards learning communication skills, and attitudes towards patient-centeredness before and after introducing a new curriculum with a group mentorship program.

Methods: A cross-sectional questionnaire-study (1-5 Likert scale) was conducted among the first class of medical students following the new curriculum (NC, n = 51) in their fifth year and the final class of students in the old curriculum (OC, n = 48) in their sixth year. The questionnaire contained questions regarding program evaluation, and statements that measured the students' attitudes towards learning communication skills and patient-centeredness. Descriptive statistics and Mann-Whitney U-test were used.

Results: NC-students felt more prepared for clinical practice than the OC-students, with median scores of 4 and 3 ($p = 0.003$). Similarly, NC-students felt more prepared regarding ethical reflections (Mdn = 4 for both groups, $p = 0.043$) and for communication with patients (Mdn = 4 for both groups, $p < 0.001$). NC-students reported significantly more positive attitudes towards learning communication skills than did OC-students. They had higher mean scores on all items regarding patient-centeredness, although these differences were not statistically significant.

Conclusions: A group-based mentorship program within the new curriculum significantly enhanced medical students' self-assessed clinical preparedness and positively shifted their attitudes towards communication skills and patient-centeredness. More research is needed to compare medical schools with and without longitudinal group mentorship programs to assess students' professional attitudes, and ideally, their performance in clinical practice.

Keywords: Mentorship, medical education, medical student, professionalism, patient-centeredness

Introduction

Clinical communication is a core skill that is essential for providing correct diagnostic evaluation and treatment, for symptom resolution, and for patients' satisfaction. [1-4] Studies have revealed that teaching communication skills to medical students can have positive effects on empathy, taking medical histories, and interpersonal communication in medical consultations. [5] Early introduction of communication skills training that runs longitudinally throughout the medical curriculum, has been shown to be effective in improving the students' psychosocial skills and confidence in clinical settings. [6-9]

Communication skills training that includes personalized feedback seems to have the strongest positive impact on medical students' skills. [5, 10] Role-playing with simulated patients or peers in small groups is the most common pedagogical method, while observing senior physicians or other students as they interview patients is the most common methods in clinical settings. [5, 11] Patient-centered approaches aim to ensure efficient communication and shared decision-making, by empowering patients to take a more active role in their care. [12] This is increasingly recognized as an important topic in health care education, as it may have a positive influence on patients' health and treatment compliance. [13, 14]

Nevertheless, some studies have suggested that medical students' attitudes towards learning and using skills in clinical communication, patient-centeredness, and empathy may decline as they progress through medical school. [15-18] This adverse trend has partially been assigned to the effect of the "hidden curriculum", that is, the informal processes within a curriculum that are often taught unintentionally. [19-21] Another theory is that certain methods of communication skills training, such as role-playing with simulated patients in front of peers and teachers, may be a source of stress and anxiety that eventually leads to self-doubt and negative attitudes. [22]

One way to integrate communication skills training and patient-centeredness in medical education, and to mitigate declining empathy among students, is to establish mentorship programs. [7, 23-25] Many mentorship programs aim to offer support and stimulate professional development, and they focus on empathy, collaboration, ethical decision-making, and patient-centered approaches. [26, 27] At the medical school at the UiT The Arctic University of Norway (UiT), a new mentorship program was established in 2012, as part of a curricular reform. The overall goal of the revised medical curriculum is to educate physicians with a holistic academic and professional competence that will enable them to treat illness and promote health through patient-centered work. [28] The new curriculum aimed to use more problem-based learning involving early patient contact and practical training in both general practice and hospital settings, and it implemented a longitudinal group-based mentorship program.

Mentoring in a group-based format can provide rich opportunities for medical students to reflect on social and relational abilities and share experiences with their peers and mentors, resulting in professional development. [23, 29] It has been shown that in a group environment, if students can actively compare and build on their own experience alongside their peers, their understanding of knowledge can be enhanced. [30]

To the best of our knowledge, there is little evidence regarding how mentorship programs influence medical students' attitudes towards professional attributes, especially when compared to students who are not offered such mentoring throughout medical school. The aim of this study was to explore whether the group-based mentorship program within the new curriculum could significantly enhance medical students' self-assessed clinical preparedness and shift their attitudes towards communication skills and patient-centeredness in a positive direction.

Methods

Study context

Medical education in Norway takes six years. Medical students at UiT spend their fifth year away from campus, training in clinical practice under supervision with real patients at small hospitals and in general practice settings. The new curriculum (NC) was introduced for first year students in 2012 and had been implemented for students in their first through fourth years by the summer of 2016. One of the main changes from the old curriculum (OC) was the introduction of a professionalism program (PROFCOM) including a mentorship program that runs longitudinally starting in the first year. Important objectives for "PROFCOM" are learning communication skills and ethics, understanding the physician's role and professional behavior, and collaboration with other health care professionals. The mentorship groups are an important arena for experiential learning during the first four years and in the sixth year in PROFCOM.

At the time of the study, each year-class of 110 students was divided into 14 groups with two mentors each. The groups consisted of seven to nine students who met with two mentors four times each year, that is, for 16 hours per year. Group meetings are mandatory for the students, and a 75% attendance rate was required. Currently, the attendance rate is 100% with some exceptions. It is also mandatory for the students to meet with one of the mentors for individual feedback and guidance each year.

Each group meeting has one or more predetermined topics or activities. Students bring video-recordings of their own consultations with real patients, or they have consultations with simulated patients in the group, and the group provides feedback. In some meetings, the students write a reflective paper followed by ethical discussions in the groups. See Table 1 for an outline of topics and activities in the mentor groups in years 1-4. Mentors are physicians

by training and have a formal affiliation with the University and/or the University Hospital. They do not receive additional financial compensation for being mentors. A half-day orientation seminar allows mentors to meet and prepare for mentoring. Once a year, all mentors are invited to attend one-day follow-up seminars.

Study design and participants

The present study was part of a larger cross-sectional survey at the UiT The Arctic University of Norway that evaluates the medical curriculum and medical students' attitudes towards communication and patient-centeredness. We developed a questionnaire containing 15 questions for program evaluation, and 27 statements that measured the students' attitudes towards learning communication skills and towards patient-centeredness. In a Likert scale ranging from 1 to 5, the items were named "strongly disagree," "disagree," "neutral," "agree," and "strongly agree."

The 15 questions regarding program evaluation asked the students to score the extent to which they felt that the curriculum in general and specific teaching sessions in particular had prepared them for clinical practice. The 27 questions regarding attitudes were based on two validated tools. The first was the Norwegian version of the Communication Skills Attitudes Scale (CSAS). [31, 32] This version comprises 22 statements regarding attitudes towards learning communication skills. Ten of the statements are negatively worded (e.g., "I can't see the point in learning communication skills"), and 12 statements are positively worded (e.g., "Learning communication skills is interesting"). The statements are presented in a random order. [32] Both the positively and negatively worded statements exceeded an alpha value above 0.8, indicating an acceptable internal consistency. Further, a satisfactory test-retest reliability using the kappa coefficients was found. [33]

The second tool was based on a survey analyzing medical students' attitudes towards patient-centered versus physician-centered practice.[34] The original study tested a total of 17 statements and found that five of these specifically measured patient-centered attitudes (e.g.: "The physician should clarify with the patient what they will discuss in the consultation"). We used these five statements to measure patient-centeredness. This tool yielded a Cronbach alpha of 0.461 (items 10, 12, and 13) and 0.626 (items 5 and 8).[34]

The students were invited to participate by e-mail. At the time of the study, the NC-students had finished their fifth year of medical school, when they were deployed to hospitals and general practice offices throughout northern Norway. The OC-students were in their sixth and final year. After piloting and adapting the survey to Questback, an invitation was sent by e-mail to the eligible NC-students (n=88, 71.6% women) and the 90 OC-students (n=90, 62.2% women) at UiT in the Spring of 2017. The Norwegian Centre for Research Data approved the study. All participants volunteered, and strict measures were in place to ensure the anonymity of all respondents. A total of 51 (74.5% female) NC-students and 48 (58.3% female) OC-students responded. Table 2 presents the characteristics of the invited and responding NC- and OC-students.

Data analysis

The statistical analyses were performed by authors EPS and UR in SPSS version 29. Descriptive statistics were conducted for the participants' characteristics. The Mann-Whitney U-test for two independent samples was used to explore the differences between NC- and OC-students regarding curriculum evaluation and the students' attitudes towards teaching communication skills and patient-centeredness. The effect sizes (r) were measured by dividing the standardized test statistic (z) by the square root of the number of observations. According to Cohen's categorization of effect sizes, 0.1 is considered small, 0.3 represents a

moderate effect, and values of 0.5 or higher imply a large effect. [35] The significance threshold for the analyses was set at 5% ($p < 0.05$).

Results

In the following comparisons between NC- and the OC-students, the results from the Mann Whitney U-test are reported. Both the NC- and the OC-students were asked how they thought the first four years of the medical curriculum had prepared them for clinical practice (Table 3). The NC-students scored significantly higher than the OC-students (Mdn = 4 and 3, $z = -3.58$, $p = .003$).

Additionally, the NC-students scored significantly higher than the OC-students when asked how the curriculum had prepared them for communicating with patients (Mdn = 4 for both groups, $z = -3.58$, $p < .001$), and on how the curriculum had prepared them for ethical reflections in clinical practice (Mdn = 4 for both groups, $z = -2.01$, $p = .043$). The OC-students felt more prepared to collaborate with other health care professionals, but this finding was not significant (Mdn = 3 and 4, $z = .55$, $p = .584$). Figure 1 provides boxplots visualizing the NC- and the OC-students' responses to these items.

The NC-students were asked how the mentorship groups and PROFCOM had prepared them for clinical practice. The median scores were 4 (IQR = 1) for both items. Further, these students were asked about the extent to which they thought each of the 10 mentorship activities had prepared them for clinical practice. Most activities had a median score of 3, and the lowest median score was 2 (Table 4).

When analyzed individually, the scores on five of the 22 items in the CSAS differed significantly between the NC- and OC-students. The NC-students scored significantly higher on three items that were positively worded and lower on two that were negatively worded (Table 5). Figure 2 visualizes the responses of NC- and OC-students on these five items. On

the five items regarding patient-centeredness, the NC-students had higher scores on all five statements, though none of these differences were statistically significant (Table 6).

Discussion

One crucial test for the relevance and efficiency of a teaching program for medical students is whether students feel that the program is helpful in preparing them for working with real patients in everyday clinical settings. Students at UiT spend most of their fifth year training with real patients in small hospitals and in general practice, giving them abundant opportunities to experience how they personally feel prepared for real life medical practice. In this study, we found that the first cohort of students enrolled in the new curriculum (NC-students) felt better prepared for clinical practice during their fifth year than did the OC-students. Specifically, the NC-students felt more prepared for ethical reflections and for communicating with patients in clinical practice. They also expressed positivity towards the mentorship groups and the professionalism program that they were a part of, and felt that that it had adequately prepared them for clinical practice. Another significant finding was that the NC-students reported more positive attitudes towards learning clinical communication skills. Additionally, they scored higher on all survey questions related to patient-centeredness than the OC-students, although these differences were not statistically significant.

Surprisingly, we found a median score of 3 among NC-students for several of the specific mentorship group activities, even though they responded positively about how the program in general had prepared them for clinical practice. Most of these activities involved recording and watching videos of role-playing or students' own encounters with simulated or real patients. Possible reasons for this discrepancy include students feeling uncomfortable and lacking experience in role-playing and video recording, and in receiving and giving structured feedback on communication skills in group settings. The use of video-cameras can generate

technical challenges, and if relied on repeatedly, this can lead to frustration. Furthermore, experiential learning, such as patient interviews that peer students and mentors observe, has been shown to cause stress, tension, and feelings of embarrassment. [22, 36] This could be especially prominent in inexperienced students, that is, those just starting medical school. [37]

Despite the relatively low scores on several of the mentorship activities, the NC-students reported a high median score on the question regarding how the mentorship groups in general had prepared them for clinical practice. They scored the mentorship groups slightly higher than the overall curriculum regarding their preparedness for clinical practice. One explanation for this is the potential positive effect of the "hidden curriculum", in that role- and behavior modelling can transmit values that are important in clinical practice, such as ethical thinking, responsibility and patient-centeredness. [38, 39] Previous studies have shown that well-functioning group mentorships can be an effective way to provide students with beneficial role models to learn from and emulate, and can allow them to evolve professionally in the company of peer students. [23, 40] Both mentors and peer students may act as important role models in these settings. [41]

Another interesting finding in our study was that both the NC- and the OC-students rated every positively worded CSAS items relatively high. At the time of the study, the NC-students were in their fifth year and the OC-students were in the sixth and final year. Other studies have reported that medical students tend to develop more negative attitudes towards patient-centeredness and communication as they progress through medical school, [15, 17] so one may expect that the attitudes to be negatively skewed. However, a Norwegian study at two universities showed that medical students' attitudes towards learning communication skills at the end of medical school had improved over a 12-year period. The authors suggest that this may illustrate the increasing expectation for physicians to have higher levels of communication skills, hence leading to greater motivation among the students. [9]

Attitudes motivate behavior, and positive attitudes are well known to contribute to obtaining specific skills. [42] In the same way, experiencing unprofessional behavior and poor role modelling can have a strong impact on students' attitudes and further behavior. [43, 44] Overall, the NC-students had more positive attitudes towards learning communication skills and towards patient-centeredness. They highly rated the items stating that learning communication skills is interesting, and that it has helped or will help them respect their patients. This finding aligns well with previous knowledge, as it has been shown that discussions in small groups and constructive feedback on students' patient encounters were associated with improvement in student performance, compared to other teaching approaches (e.g. lectures). [45]

Previous studies have reported that longitudinal and integrated training in medical school can improve psychosocial skills, such as communication skills and empathy. [9, 24, 46] Participating in reflective discussions with peers, particularly if accompanied by positive role models, helps students in developing psychosocial skills. [47, 48] Based on existing knowledge, this study proposes that a decline in attitudes may not necessarily be solely attributed to changes in students' cognitive attitudes. Poor learning experiences may also contribute to the development of less positive attitudes. [25, 32] The consistently positive attitudes among NC-students towards communication skills and patient-centeredness calls for a deeper exploration of the factors that influence positive learning environments in medical education.

The findings of this study offer insights into the potential of a group-based mentorship program in medical education to foster positive attitudes towards important interpersonal skills. Hopefully, our findings can highlight the importance of incorporating elements that specifically prepare students for real-world clinical practice, patient communication, and ethical decision-making to better equip future physicians for the complexities of clinical practice.

Limitations

A possible limitation of this study is that the students responding to our survey may have had more positive feelings towards the curriculum, the teaching of communication skills teaching and patient-centeredness than the non-responding students. Furthermore, it is likely that the first class of mentors at UiT were highly motivated, which may have affected the NC-students' positive assessment of the mentorship program. Therefore, it is essential to repeat this evaluation. In any study that measures respondents' attitudes, the possibility of response bias exists. This occurs when participants provide inaccurate answers to questions, and bias can occur if they choose to report what they believe is socially acceptable. [49]

Another limitation concerns the possibility of recall bias, when time affects memory. [50] It may have been challenging for the NC-students to recall how they experienced each of the mentorship activities in the beginning of medical school. Further, this study was conducted at a single university, which limits generalizability, but our results may be relevant for other universities that educate doctors. The cross-sectional design of this study makes it challenging to infer causality. [51]

Future research should compare medical schools with and without longitudinal group mentorship programs with regards to both the students' attitudes towards communication skills training and patient-centeredness, and ideally how they perform in clinical practice. To mitigate recall bias, it may be beneficial to use shorter recall periods or conducting mixed methods studies. Further research with a larger sample size could explore the significance of the differences observed.

Conclusion

Medical students who followed a longitudinal group-based mentorship program felt better prepared for clinical practice than students in a traditional curriculum. The findings also

revealed a positively shift in the students' attitudes towards communication skills and patient-centeredness. This indicates that group-based mentorships can be a valuable teaching resource. Hopefully, our findings can highlight the importance of incorporating elements that specifically prepare future physicians for clinical practice, patient communication, and ethical decision-making. More research is needed to further explore influences on students' professional attitudes, and how students with and without a longitudinal group mentorship perform in clinical practice.

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Table 1 Topics and activities in the mentorship groups at the time of the study

Year/term		Topics*	Activities
Year 1	Autumn	Patients' experience of living with a chronic illness; what is a good doctor	Video of interview with a patient in general practice
	Spring	How to provide information to patients; uncertainty	Video of role play between students
		Conversation with a patient with breast cancer and her family member; ethics; students' reaction to serious illness	Video of role play between students
Year 2	Autumn	Motivational interview: changing lifestyle; patient autonomy	Video of role play between students
		Gathering information from a patient; integrating information about current medical problem; the patient's perspective; communication skills	Video of interview with a patient at either an outpatient or inpatient clinic
	Spring	"Ethics in everyday medical practice"; a patient encounter that affected the student emotionally	Students write a reflective paper for discussion about ethics in groups
		History-taking in general practice	Video of patient encounter in general practice
Year 3	Autumn	Gathering information from a patient; integrating information about a current medical problem; the patient's perspective; communication skills	Video of interview with a patient at either an outpatient or inpatient clinic
		Same as above	Same as above
	Spring	History-taking; examination; analysis and planning with a patient in general practice	Video of a patient encounter in general practice
		"Ethics in everyday medical practice"; a patient encounter where a physician behaved in an unfortunate manner	Students write a reflective paper for a discussion about ethics in groups
Year 4	Autumn	History-taking with a pregnant woman referred for an early ultrasound; ethical topics in gynecology and obstetrics	Video with a pregnant woman and her partner in a gynecological outpatient clinic; discussion and reflection of ethical topics
		Routine control of children at healthcare centers, history-taking, and examination; clinical encounters with children; providing "bad news" to parents of a newborn with Downs syndrome	Video with children and their relatives at the healthcare center; videos on YouTube; role-playing in the mentor groups with simulated patients (the parents)

	Spring	Ambivalence, abortion; physicians on night shifts; patients' experience of how to live with a chronic, potentially lethal disease and GPs' experience of providing health care (after lecture with a patient)	Role-playing in the group with a simulated patient and ethical reflections; reflection notes and discussions in the group after shadowing a physician during a night shift at the hospital; reflection notes and discussions.
		History-taking; examinations; analysis and planning of patients in general practice	Consultations with simulated patients in the group

*=In most meetings, there is also time to discuss topics that students raise about professionalism, communication, and ethics

Table 2 NC- and OC-students' characteristics

Legend:

NC = The first class of students enrolled in the new curriculum; in their fifth year at the time of the study

OC = The final class of students using the old curriculum; in their sixth and final year at the time of the study

	Invited						**Respondents**					
	Female		Male		Sum		Female		Male		Sum	
	n	%	n	%	n	%	n	%	n	%	n	%
NC	63	71.6	25	28.4	88*	100	38	74.5	13	25.5	51*	100
% of invited							60.3		52		57.9	
OC	56	62.2	34	37.8	90	100	28	58.3	20	41.7	48	100
% of invited							50.0		58.8		53.3	

*= Eight students were excluded from the analyses as they reported that they did not attend any mentorship activities

Table 3 NC- and OC-students' assessment of how the medical curriculum prepared them for clinical practice

Item		Students	Median*	U	Z	Effect size (r)	P-value
How the first four years of medical curriculum prepared them for clinical practice		NC	4	828.5	-3.58	0.35	0.003**
		OC	3				
How the medical curriculum prepared them for:	communication with patients and their next-of-kin	NC	4	748.5	-3.58	0.35	<0.001**
		OC	4				
	ethical reflections	NC	4	951.5	-2.01	0.20	0.043**
		OC	4				
	collaboration with other health care professionals	NC	3	1297.5	0.55	0.05	0.584
		OC	4				

*= Likert score 1–5

**= Statistically significant, $p<0.05$

Table 4 NC-students' assessment of how the mentorship groups prepared them for clinical practice

Survey question	Activities	Median Likert* score (IQR)**
To what extent do you think that the mentorship groups has prepared you for clinical practice?		4 (1)
To what extent do you think that PROFCOM has prepared you for clinical practice?		4 (1)
To what extent do you think that each of these activities in the mentorship groups has prepared you for clinical practice?	Feedback on video with a patient in general practice	3 (1)
	Feedback on video with a patient in an outpatient clinic or bed ward	3 (1)
	Feedback on video with a patient at the health center	3 (1)
	Feedback on video of role play with a peer student	2 (1)
	"Consultation" with a simulated patient in the groups	3 (1.25)
	Reflection notes after shadowing a physician during a night shift in the hospital, followed by discussion in groups	2 (1)
	Reflection notes on ethical challenges, followed by discussion in groups	3 (2)
	Discussions on YouTube videos in groups	3 (1.75)
	Individual talk with one of the mentors	3 (2)

*=Likert scale ranged from 1 – to a very small extent to 5 – to a very large extent

**= IQR = Interquartile range, Q3-Q1

Table 5 Items in the Communication Skills Attitude Scale on which NC- and OC-students scored significantly differently

		NC students	**OC students**	U	Z	Effect size (r)	P-value*
No.	Item	Median	Median				
5	Learning communication skills has helped or will help me respect patients	4	4	1032	-2.51	0.25	0.012
6	I haven't got time to learn communication skills	1	2	848	3.99	0.40	<0.001
7	Learning communication skills is interesting	4	4	1101	-2.07	0.20	0.039
11	Communication skills teaching states the obvious and then complicates it	3	3	1097.5	2.13	0.21	0.033
18	I think it's really useful learning communication skills in medical school	4	4	1055.5	-2.39	0.24	0.017

*= $p<0.05$, Mann-Whitney U-test

Table 6 Median scores on items regarding patient-centered attitudes* (NC and OC students)

		NC-students	**OC-students**	U	Z	Effect size (r)	P-value**
No.	Item	Median	Median				
5	The patient should express agreement with the physician to signal respect and trust	2	1.5	1219.5	-1.29	0.13	0.195
8	The patient should relate to what the physician says and not seek information about their illness on their own	2	2	1350.5	-0.43	0.04	0.664
10	The physician should consider the patient's advice in medical decision-making	5	5	1317	-0.80	0.08	0.421
12	The patient's description of the symptoms is important to get the correct diagnosis	5	5	1276	-1.20	0.12	0.233
13	The patient should be treated as the physician's equal, equivalent in power and status	4	4	1250	-1.10	0.11	0.272

*=The five items that specifically measure patient-centered attitudes in the study by Solheim et al.

**= Mann-Whitney U-test

Figure 1 Box plot showing distribution of self-reported preparedness (Likert scale 1-5), sorted by NC- and OC-students. Horizontal bold line = median

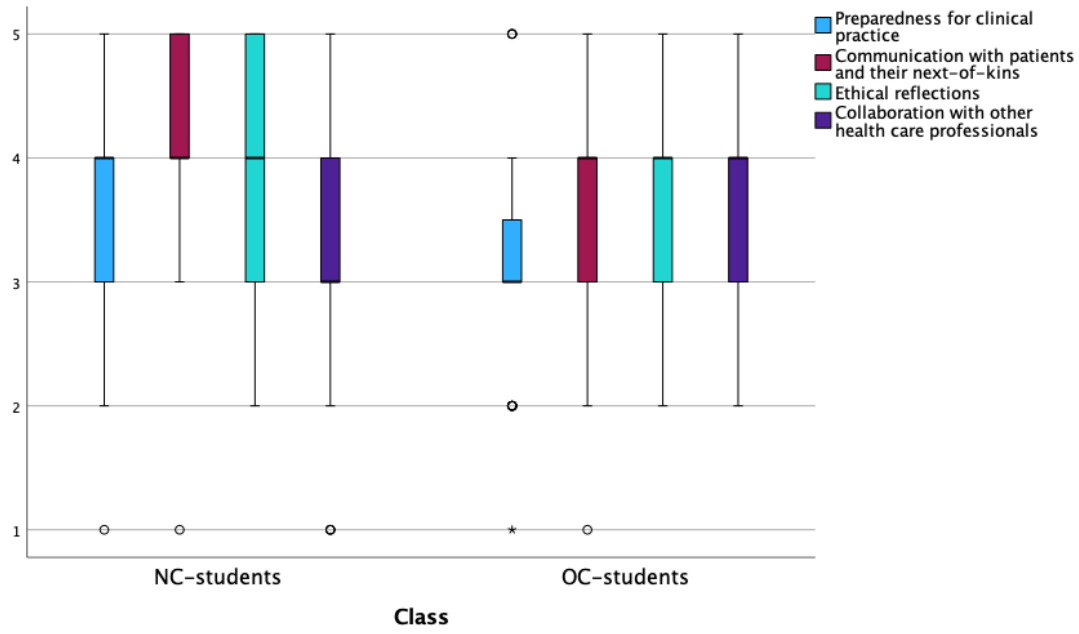
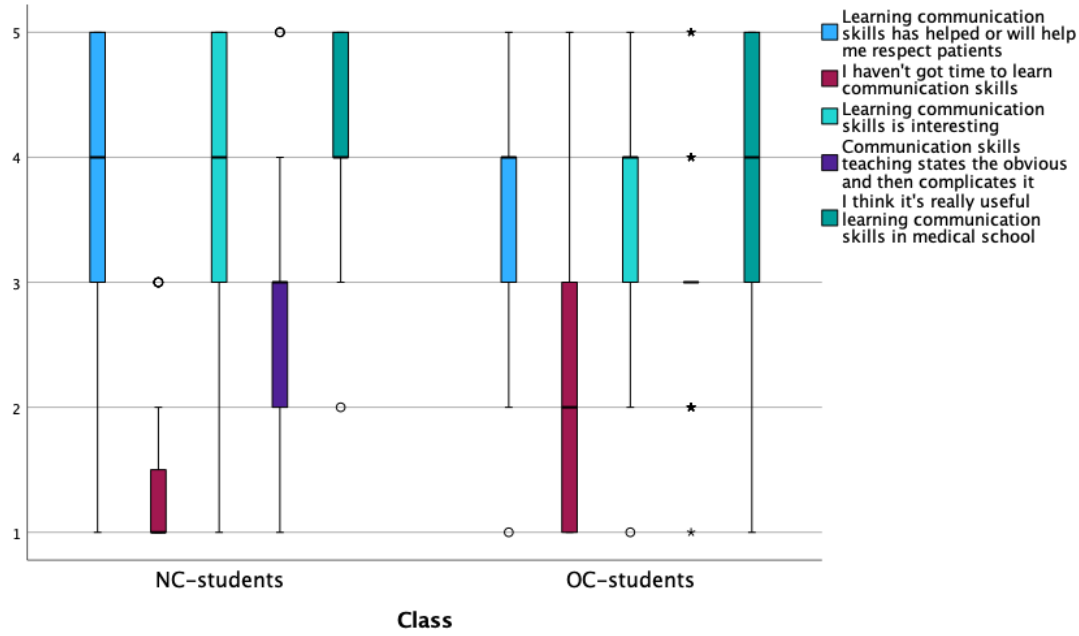


Figure 2 Box plot showing distribution of items regarding patient-centered attitudes (Likert scale 1-5), sorted by NC- and OC-students. Horizontal bold line = median



Appendix 1 The CanNorMent survey

Dear colleague,
Thank you for helping us improve medical education!

This survey concerns your experiences and opinions regarding mentorship programs for medical students.
Please consider either a mentorship program you are currently involved in or one in which you were a participant within the last 10 years. Note that some questions are worded so as to also be meaningful for mentor colleagues in Norway, who receive the same questionnaire.

If you are not currently a mentor, please answer the questions as if they were worded in the past tense.

Gender

(1) ❑ Female

(2) ❑ Male

(3) ❑ I prefer not to answer

Age

(1) ❑ Below 40

(2) ❑ 40-49

(3) ❑ 50-59

(4) ❑ 60 +

Where are you a mentor?

(3) ❑ McGill

(1) ❑ Tromsø

(2) ❑ Bergen

If you have had a group in 2016-17, how many years has the group functioned?

(7) ❑ I have not had a mentor group in 2016-17

(1) ❑ 1 year

(2) ❑ 2 years

(3) ❑ 3 years

(4) ❑ 4 years

Did you volunteer to become a mentor, or is it mandatory in your job?

(1) ❑ I volunteered

(3) ❑ I was strongly urged by the leader of my department

(2) ❑ It is mandatory in my job

What is the nature of your current work?

(1) ❑ Mostly clinical

(2) ❑ Some clinical

(3) ❑ No clinical

For how many years, in total, have you been a mentor of medical students?

_____

If you consider the totality of your experience of being a mentor, how do you like it?

(1) ❑ 1 I dislike being a mentor

(2) ❑ 2

(3) ❑ 3 Neither like nor dislike

(4) ❑ 4

(5) ❑ 5 I like being a mentor

Please indicate your agreement with the following statements:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Don't know
1. Being a mentor has helped me become better at what I do professionally	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
2. It is difficult to know whether students in my/our group find the meetings worthwhile	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
3. The students seem to find the group meetings valuable	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
4. It is disturbing when students seem to dislike or be bored during meetings	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
5. Students participate because it is mandatory, not because they appreciate its value	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
6. I find it unclear what the mentor program's expectations are (i.e. the intended curriculum)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
7. I find it difficult to fulfill the program's expectations (i.e. the intended curriculum)	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑
8. Currently, I find it difficult to invest in my mentoring function	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑	(6) ❑

Research suggests that mentors have different goals, and use various approaches, in their mentoring. Indicate your level of agreement for each of the following:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. As a mentor I answer questions and provide knowledge	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
2. As a mentor I share what it means to be a doctor	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
3. As a mentor I listen to students without offering advice	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
4. As a mentor I stimulate collaboration and relationships within the group	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
5. As a mentor I am a role model for the students	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
6. As a mentor I provide career counseling	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
7. As a mentor I take an interest in students' personal development	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
8. As a mentor I share my experiences of doubt and uncertainty	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
9. As a mentor I share my attitudes and judgments concerning values and dilemmas in medicine	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

The following statements describe the functioning of mentor groups. Please indicate your level of agreement with each of them, concerning your own group

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. The students in my group have lots of ideas for the group process and discussions	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
2. I rely strongly on the material and teaching methods provided by the university to structure the mentor meetings	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
3. I let the group decide how to use the time, without any preconceived plan	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

Mentor groups discuss a variety of topics. Indicate how interesting you believe the following topics are, for discussion in your group

	How interesting is this topic?				
	Completely uninteresting	Clearly uninteresting	Neutral	Clearly interesting	Very interesting
1. Clinical communication	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
2. Career planning	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
3. Students' clinical experiences	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
4. Students' experiences in medical school	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑

	How interesting is this topic?				
	Completely uninteresting	Clearly uninteresting	Neutral	Clearly interesting	Very interesting
5. Students' private experiences	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
6. How the mentor group works for the participants	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
7. Physicians' wellness issues	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
8. Medical students' wellness issues	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
9. Clinical skills training	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
10. Ethical dilemmas	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
11. Health politics	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
12. Poverty and health	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
13. Clinical reasoning	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
14. Issues of empathy	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
15. Patient-centered medicine	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑
16. Suffering and sickness	(12) ❑	(13) ❑	(15) ❑	(14) ❑	(17) ❑

Roughly how much time and/or attention has been paid to each topic so far, in your current/last group?

	Time/attention paid to this topic		
	Not discussed in the group	Discussed occasionally	Discussed a lot
1. Clinical communication	(11) ❑	(12) ❑	(13) ❑
2. Career planning	(11) ❑	(12) ❑	(13) ❑
3. Students' clinical experiences	(11) ❑	(12) ❑	(13) ❑
4. Students' experiences in medical school	(11) ❑	(12) ❑	(13) ❑
5. Students' private experiences	(11) ❑	(12) ❑	(13) ❑
6. How the mentor group works for the participants	(11) ❑	(12) ❑	(13) ❑
7. Physicians' wellness issues	(11) ❑	(12) ❑	(13) ❑
8. Medical students' wellness issues	(11) ❑	(12) ❑	(13) ❑
9. Clinical skills training	(11) ❑	(12) ❑	(13) ❑
10. Ethical dilemmas	(11) ❑	(12) ❑	(13) ❑
11. Health politics	(11) ❑	(12) ❑	(13) ❑
12. Poverty and health	(11) ❑	(12) ❑	(13) ❑
13. Clinical reasoning	(11) ❑	(12) ❑	(13) ❑
14. Issues of empathy	(11) ❑	(12) ❑	(13) ❑
15. Patient-centered medicine	(11) ❑	(12) ❑	(13) ❑

		Time/attention paid to this topic		
		Not discussed in the group	Discussed occasionally	Discussed a lot
16.	Suffering and sickness	(11) ❑	(12) ❑	(13) ❑

Please indicate other topics that have been important in your group(s):

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Among the following possible rewards of being a mentor, indicate their importance for yourself

	Importance for me				
	Not important	A little important	Somewhat important	Quite important	Very important
1. I learn a lot from discussing with students	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
2. The preparation and orientation offered to all mentors gives me new knowledge	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
3. The relationships with students are gratifying	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

	Importance for me				
	Not important	A little important	Somewhat important	Quite important	Very important
4. Mentoring makes me more proud of being a physician	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
5. Mentoring allows me to explore what it means to be a "good doctor"	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
6. Mentoring provides financial rewards	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

Other aspects of mentoring that you find rewarding?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

What is your opinion about the quality of the training provided, including workshops and information meetings, to help mentors?

(2) ❑ Very poor

(3) ❑ Poor

(4) ❑ Both good and poor

(5) ❑ Good

(6) ❑ Very good

What is your opinion about the quality of the written material on mentoring and the mentor program, provided to you as a mentor?

(1) ❑ Very poor

(2) ❑ Poor

(3) ❑ Both good and poor

(4) ❑ Good

(5) ❑ Excellent

If you have suggestions for training and information offered to mentors, please write here:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Mentors can work alone or in pairs. Little is known about how this affects mentors and students. The following items address your experience and views on this. You must answer the next question, to be able to move on...

Do you have a co-facilitator or co-mentor?

(1) ❑ Yes, a senior student

(2) ❑ Yes, a physician

(3) ❑ Other

(4) ❑ No

If you have a co-mentor, how different is he or she from you on the following characteristics?

My co-mentor's gender

(1) ❑ Same

(2) ❑ Different

My co-mentor's age

(1) ❑ Roughly the same

(2) ❑ More than five years older than me

(3) ❑ More than five years younger than me

My co-mentor's way of being a mentor

(1) ❑ Roughly the same

(2) ❑ Clearly different (In what way? Please write:) _____

My co-mentor's experience as a physician

(2) ❑ I view my co-mentor as having a lower level of experience than me

(3) ❑ I view my co-mentor as having roughly the same level of experience as I

(1) ❑ I view my co-mentor as having a higher level of experience than me

My co-mentor's experience as a teacher

(3) ❑ I view my co-mentor as having a lower level of experience than me

(1) ❑ I view my co-mentor as having roughly the same level of experience as I

(2) ❑ I view my co-mentor as having a higher level of experience than me

If you have a senior medical student as a co-mentor, please indicate your opinions on the following topics:

Has your relationship with your co-mentor developed into a resource for you, in any of the following ways?

	My co-mentor has become a resource for me		
	Yes	No	Not applicable
In clinical work	(1) ❑	(2) ❑	(3) ❑
Creating network, providing contacts	(1) ❑	(2) ❑	(3) ❑
Personal development	(1) ❑	(2) ❑	(3) ❑
In research	(1) ❑	(2) ❑	(3) ❑
In teaching	(1) ❑	(2) ❑	(3) ❑
In mentoring	(1) ❑	(2) ❑	(3) ❑

For my functioning as a mentor, my student co-mentor has represented

(1) ❑ A very negative contribution

(2) ❑ A somewhat negative contribution

(3) ❑ A neutral contribution

(4) ❑ A somewhat positive contribution

(5) ❑ A very positive contribution

Please indicate your agreement with the following statements. My student co-mentor has:

	Agreement				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. Helped me out with logistics and organization of the mentor meetings	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
2. Helped me understand and connect with the students	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
3. Challenged my authority in the group	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
4. Helped me with ideas and suggestions for reflection	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
5. Had difficulties understanding his or her role as a mentor for the younger students	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

Other comments on the experience of having a student co-mentor?

_____
_____
_____
_____

_____
_____
_____
_____
_____
_____

Have you and your co-facilitator shared the responsibility of mentoring in a fair way?

(1) ❑ Yes

(2) ❑ No, too much has fallen on me

(3) ❑ No, too much has fallen on my partner

Please indicate you level of agreement with the following statements concerning mentoring in pairs

	Agreement				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. I would generally prefer to work in a pair rather than as a single mentor	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
2. Being in a pair gives me more flexibility in scheduling meetings	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
3. Being in a pair provides more material and issues for group discussions	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
4. I like very much to work with my co-mentor	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

	Agreement				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
5. My co-mentor and I have very different roles in the group	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
6. In general, the program would benefit if mentor pairs where changed halfway through the mentorship program	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
7. I would not have volunteered as a mentor if it meant leading the group alone	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
8. Being in a pair enhances relationship building with students	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
9. Being in a pair enhances the richness of the mentoring experience	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

Imagine that the structure of the PA program were modified such that you were given the option of having a physician colleague as a co-mentor instead of the senior student.

Consider the following statements, and indicate your level of agreement.

Working as a duo would have the following advantages:

	Agreement				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. There would be more flexibility in scheduling meetings	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
2. It would provide more material and issues for group discussions	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
3. It would enhance relationship building and connecting with students	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
4. It would enhance the richness of the experience and contribute to my learning	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

If you were to choose the best co-mentor arrangement for you, which of the following would you prefer?

(1) ❑ I would prefer not to have a co-mentor

(2) ❑ I would prefer a senior student as co-mentor

(4) ❑ I would prefer a physician as co-mentor

(3) ❑ I would like a co-mentor, but have no preference for student or physician

(5) ❑ I have no clear opinion

Would you be willing to be contacted at a later time and participate in a research interview, group-based or individual, to talk more in depth about your experiences and reflections as a mentor? (We plan to contact a small subgroup of mentors for interviews)

(1) ❑ Yes, I am willing to be contacted by e-mail for a research interview on my experiences as a mentor

(2) ❑ No, I do not want to be contacted by e-mail for a research interview

Please write your e-mail address

_____

Would you, at a later stage, be willing to be a mentor again, for a new group of medical students?

(1) ❑ Definitely not

(2) ❑ Probably not

(3) ❑ Neutral

(4) ❑ Probably yes

(5) ❑ Definitely yes

Finally, we invite you to comment on anything in your mentoring experience that you would like us to know. Both positive comments and suggestions for improvement are very valuable for ensuring the quality of mentorship programs

_____
_____
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When you click "finish", the survey is automatically submitted. A publicity webpage in Norwegian will appear. It contains information about the research instrument. There is no risk of you being contacted by the company nor by any third party. Cookies at the website are only used for publicity for the research instrument.

Thank you!