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THE INFLUENCE OF WORKPLACE LEARNING ON THE DEVELOPMENT OF MEDICAL STUDENTS' PROFESSIONAL IDENTITY

Ph.D. thesis

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List of Abbreviations

ABCDE	Airway, Breathing, Circulation, Disability, Exposure assessment method
AEE	Authentic Early Experience
AMEE	The International Association for Health Professions Education
CBME	Competency-based Medical Education
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
COP	Community of Practice
DREEM	Dundee Ready Educational Environment Measure
ECE	Early Clinical Experience
ECP	Early Patient Contact
ECV	Explained Common Variance
EFA	Exploratory Factor Analysis
EGA	Exploratory Graph Analysis
ExBL	Experience-based Learning
ICC	Intra-Class Correlations
IECV	Individual Explained Common Variance
GP	General Practitioner
KMO	Kaiser-Meyer-Olkin test
MCPI	Manchester Clinical Placement Index
MLMV	Maximum Likelihood Mean- and Variance- adjusted estimation

MSEQ	Medical School's Environment Questionnaire
MSLES	Medical School Learning Environment Survey
OSCE	Objective Structured Clinical Examination
PIF	Professional Identity Formation
RMSEA	Root Mean Square Error of Approximation
RPL	Real Patient Learning
TLI	Tucker-Lewis Index
UK	United Kingdom
WLSMV	Weighted Least Squares Mean and Variance adjusted parameter estimation
ZPD	Zone of Proximal Development
ω	Coefficient Omega
ω_H	Coefficient Omega Hierarchical
ω_{HS}	Coefficient Omega Hierarchical Subscale
ω_S	Coefficient Omega Subscale

1. Introduction

1.1. The importance of medical education

Demographic and societal changes worldwide, such as aging populations and globalisation, are leading to a steadily increasing demand for healthcare professionals (1). Healthcare professionals are educated in specially designed training programmes, such as medical training, where students acquire pre-defined competences to demonstrate that they have met the requirements for the degree (2). However, a large proportion of students may feel unprepared to start work (3) as there may be a mismatch between the competences and actual abilities of medical students (4). Unpreparedness has a series of implications; firstly, it can lead to problems related to patient care, as mistakes and errors can result in serious adverse events (5). Secondly, the sense of unpreparedness has an impact on the attitude of future doctors, as it can result in a detachment from person-centredness and eventually may lead to burnout. Burnout affects a large proportion of medical students globally, with prevalence rates ranging from 45 to 71 % (6). The literature suggests that student burnout is strongly associated with the workplace climate (7) and the acceptance of students by peers and colleagues (8).

Difficulties in medical training can have significant economic and institutional impacts, and can lead to even more drastic consequences, such as dropout from medical school. The dropout rate among medical students is considerable, affecting 9.1% of medical students worldwide (9), while among Hungarian medical students this figure is 15.5% (10). Moreover, with recent global educational programmes, these numbers may increase further as many students are studying abroad due to globalisation and face not only professional challenges but also personal difficulties (11).

Mapping these processes is relevant for the entire healthcare sector, as burnout-related problems increase the risk of medical errors and thus impair patient safety (12). Based on the relevant consequences of healthcare education on patient safety, global organisations are focusing on education and launching strategic frameworks to reduce the occurrence of avoidable harm (13).

1.2. The recent changes in medicine and medical education

In the last decades, medicine has changed in many ways due to advances in medical knowledge and technology. Medicine is now increasingly organised around specific disease spectrums, allowing professionals to deepen their specialised skills and expertise. Consequently, the healthcare system itself has become specialised and there are now distinct medical specialties with limited connections between them, resulting in the fragmentation of medicine, potentially leading to ineffectiveness and depersonalised care (14, 15). Likewise, the context of medical care has changed, outpatient setting has become the main location of patient care (16). Additionally, the COVID-19 pandemic has led to further significant societal changes that have placed an increasing burden on medical professionals (17). Alongside these changes, the understanding of legitimate knowledge in medicine has been transformed, the emphasis has shifted from clinical experience to statistical analysis of observations around specific diseases (18). However, focusing explicitly on the biomedical model of diseases without contextual factors reduces the complexity of a person's health (19-21).

Along with the evolution of medicine, the horizon of medical training has also changed. For centuries, medicine was learned and taught as an apprenticeship. Traditional apprenticeship was a longitudinal training, where continuous supervision was provided and driven by a personal and collegial relationship. Afterwards, the first clerkship programs emerged based on societal changes in the nineteenth century, then the organisation of medical education was reformed by Abraham Flexner, who stated that high-quality medical education should be science-based. He established the foundation of traditional medical school, where theoretical subjects are followed by the clinical practice (theory-before-practice curriculum) (22). Since then, medical schools have evolved into complex medical centres where research and economic aspects have become relevant, thus shifting the focus of medical education from reflective practice to an objective, evidence-based stance (18, 23). The post-pandemic era and the advances of the twenty-first century have also resulted in further changes in medical education, as online teaching has become widespread (24) and artificial intelligence is increasingly becoming an inevitable factor (25).

1.3. The purpose of medical training

The purpose of medical training is multifaceted and focuses on several aspects. Firstly, one aspect concentrates on the acquisition of practical knowledge, which has “two goals: to develop and provide an education that effectively prepares medical professionals for their current and future tasks, and to develop an evidence base that can inform and be informed by practice” (26). Secondly, the focus is on development itself, as “medical education is a lifelong process embracing premedical experience, undergraduate education, general clinical training, specialist or vocational training, subspecialty training, and continuing medical education” (27). Furthermore, identity formation is a task of the medical school to “shape the novice into the effective practitioner of medicine, to give him the best available knowledge and skills, and to provide him with a professional identity so that he comes to think, act, and feel like a physician” (28). Finally, since medical practice today is no longer limited to the necessary skills and factual knowledge, other aspects - such as collaboration with other healthcare professionals and creating the optimal management of the healthcare system - have also become important in medical training (29).

1.4. Learning theories connected to medical education

Medical training is situated between the fields of learning and work, and is closely connected to experience, therefore the introduction of related learning theories is advisable. Learning theories have different philosophical backgrounds, the two main approaches to learning in medicine are based on cognitive and socio-cultural perspectives. Cognitive theorists concentrate on the internal learning process of the individual, where students are taught by teachers and experiences shape understandings (30). Experience has a great relevance in learning; Kolb’s learning cycle focuses on the importance of reflection and cyclicity in the process. In this concept, concrete experiences, followed by reflection, lead to generalisation and conceptualisation, which eventually is transformed into knowledge (31). Furthermore, medical education is a form of adult learning (andragogy) with the aim of changing existing habits and perspectives. New information has to be incorporated into the existing frame of reference, and the teacher, as a facilitator, should help students transform their prior knowledge and connect it to new information (32).

Socio-cultural theorists focus on the connection between social and individual participation. Socio-cultural theories are based on Vygotsky's tenet, as the individual could be understood only with his or her cultural means, and the society could only be understood with the agency of individuals (33). This theory gave rise to the theory of situated learning, according to which learning stems from participation in culturally valued, collaborative practice. In this practice, learners are legitimate peripheral participants: they are legitimate because they have to be there, peripheral because others are at the center of the practice, and participants because their participation is the means of learning (34). In the context of learning, there is an interdependence between individual and social aspects, which is constantly negotiated around experiences. The individual learner is at the center of the process, as participation and learning are linked to an individual's subjective preferences, while an individual's cognitive experiences are also shaped through participation (35). Overall, people with a shared domain of interest form communities of practice (COP) (36).

However, workplaces are open systems, where internal and external influences are constantly changing the system and the relationships of the participants, so transformation has great relevance. Firstly, when a question arises and is solved with the guidance of a more experienced mentor, this happens in the zone of proximal development (ZPD), which refers to the distance between the actual developmental level and the potential level of development (33). Secondly, there is a difference between individual action and collective activity; this goal-oriented joint action is described by activity theory. In an activity system the subject is oriented toward an object (e.g. a problem around patient care) and the process is mediated by rules, instruments, community and the division of labour (37). When difficulties or contradictions arise, a temporary formulated network of professionals in a specific situation collectively provides a better solution than experts working isolated in different fields. This eventually leads to expansive learning and the transformation of the activity system. The entire process happens in the ZPD, and is mediated by language and dialogues (38). Finally, language is central to these social actions, as talk offers social possibilities for people to construct positions for themselves and others in the community (39).

1.5. Workplace learning in medicine

Workplace learning presents a complex learning process, its rules are rarely explicit, and it targets ordinary everyday aspects where work and learning overlap. The work itself, the individual worker and relationship with others ultimately influence the learning process. Altogether, the learning process and contextual factors together constitute ‘workplace learning’ (34, 40).

The learning environment provides the context for learning. The learning environment is related to the physical space and the atmosphere of participation, in other words, it is connected to the place and the feelings, relationships experienced there (41). Within medical education two types of learning environments exist. First, the university setting, which is specially designed for learning in classes, seminars and is primarily focused on learning. This option embodies the theoretical part of medical education. The other learning environment is located in hospitals and primary care surgeries, where the emphasis is rather on work. This setting is related to the clerkship phase of medical training (42).

In medical education, much of the work takes place in the patient rooms between preceptors and learners (43). Due to the ad hoc nature of workplace learning, there is a noticeable distinction between what is taught and what is learned by students. From an organisational perspective, course designers create a planned curriculum, which is delivered by teachers with practical aspects in mind, and eventually internalised by students – influenced by numerous factors (44). On the other hand, socio-cultural components are embedded in the outcomes of medical training: the formal, the informal and the hidden curricula. Firstly, the formal curriculum is the list of stated, intended objectives; secondly, the informal curriculum takes place as an interpersonal form of learning between preceptors and students. Finally, the hidden curriculum is a set of influences at the cultural level that draws attention to customs, rituals, and taken-for-granted aspects (45).

1.6. Challenges of learning medicine in clinical setting

Based on the literature, medical students’ attitude and empathy begin to decline as they start clinical clerkships and do not return to the preclinical level even in later stages of

their training (46-48). These changes are based on several factors, such as personal and socio-cultural aspects. Medical students may have unrealistic expectations of medicine and medical training because of their deep desire to become physicians (49). However, meeting the clinical environment may be stressful for students (50, 51), as this is the first time they are faced with the 'reality of medicine', experiencing morbidity, responsibility for caring for others, and negative attitudes (52).

Students face cultural, practical and even communication challenges in these new learning environments (53), and may conclude that clinical workplaces differ greatly from one another not only from an organisational perspective but also in the relationships between participants (54). The relationship between students and preceptors is largely grounded in the hierarchy of medicine, where students obtain a peripheral position in the workplaces (55). Consequently, learners are often shamed during these encounters, which can trigger strong emotional, physical and cognitive reactions (56). In addition, members of student groups may also become competitive with their peers (45). To illustrate these processes, during case presentations, medical students use strategies to avoid criticism and maintain control, so they tend to just get through the presentations rather than focusing on understanding the learning objectives (57). This can be explained by the gap between preceptors' and students' perceptions of learning activities. Preceptors focus rather on explicit learning outcomes and facts, while students place preceptors' pedagogic skills and communication ahead of clinical knowledge (58, 59). Finally, as recent changes in medical training have promoted competency-based medical education (CBME), this may predispose students to these stresses, as CBME focuses on outcomes and competencies, and, consequently it may convey to students that reaching these milestones is the goal of medical education (2).

Overall, learning medicine in clinical settings is a complex activity, and current trends in medical training tend to promote the acquisition of knowledge and skills. However, considering the personal and social qualities of medicine, the development of professional identity is an inevitable part of medical training (60, 61). To foster this progress, the guidance from preceptors is pivotal, as they have the potential to create relationships with learners that can create a ZPD in which students can safely learn the elements of medicine (62).

1.7. Experience-based learning

Experience-based learning (ExBL) is a theory of how medical students develop the medical identity during their progression from entering medical school to becoming a qualified doctor. ExBL is grounded in adult learning theories and was developed by Tim Dornan from a series of empirical research and literature reviews. The first generation model of ExBL was developed based on empirical research (63). Further research in the field and a systematic literature review of 168 articles resulted in a revised model (64). Subsequently, the AMEE guideline of ExBL was developed based on further empirical research, the findings of a literature review of 124 articles, and the conclusions of a multi-level expert panel (65).

In ExBL, the attention is on individual students' learning, which is situated within the context of the clinical environment. This is learning rather than teaching, as students learn even when the preceptors focus exclusively on clinical care. Therefore, this epistemological stance on learning resolves the dichotomy between the taught and learned curricula (66). Clinical education is located in the workplace (every location where doctors work), and students learn from experience, which is defined as authentic (as opposed to simulated) human interaction that helps students learn about health and how to be a doctor. Preceptors have a central role in this process, as they provide safety for patients and support students in facing challenges. This multi-faceted safety is based on three types of support – organisational (organisation of facilities, placement and curriculum), pedagogical (how clinicians support students' learning) and affective (positive attitude of the staff). During participation, students move from a passive role to an active one, which is achieved through learning on real patients. The outcome of the process is a combination of capabilities: an intellectual capability of knowing, a practical outcome to be skilled and an affective capability, based on emotions, values (65, 67).

1.8. Early clinical experience

Early clinical experience (ECE) is an option to express the principles of ExBL while expanding learning in a clinical setting. ECE is defined by two characteristics, early refers to “what would traditionally have been regarded as the preclinical phase, usually the first two years” of medical school and experience as “authentic human contact in a social or

clinical context that enhances learning of health, illness, and the role of the health professional” (68). In the literature many expressions exist to describe these types of practicals, such as authentic early experience (AEE), early patient contact (EPC) and early practical experience (EPE). For clarity, I will use ECE in the following when presenting the possibilities of this modality.

There is a wide range of curricular application of the ECE, as medical schools ‘vertically integrate’ various types of practical experience into traditionally theoretical years. In a Europe-wide study, most practicals were in primary care settings, while the hospital setting was less prominent. The learning objectives of the different ECE programs focused on communication skills or observation, as simply experiencing the atmosphere of the clinical settings (69). In the United Kingdom (UK), this element of medical training is widely accepted, with most programs taking place in primary care, however there are considerable differences in the arrangements of ECE (70). The organisation may also differ, as pointed out in a UK review, which reported 73 % of programs were compulsory and 27% voluntary. Most responses to the evaluation of the courses were positive, with students, teachers, organisations, and patients all considering the courses beneficial (71).

ECE has numerous positive educational effects, such as students’ cognitive and emotional development. First, ECE effectively reinforces the training of formal classroom communication skills (72), and improves the quality of knowledge integration (73). Along with intellectual benefits, ECE also promotes emotional changes (74), and helps students understand patients’ perspectives receiving healthcare provision (75). Overall, ECE fosters the development of empathic attitudes and person-centredness (76). Likewise, ECE seems to ameliorate the shock of transition to the clinical phase (77). From an educational perspective, it supports narrowing the gap between preclinical and clinical training (78).

Overall, ECE is based on knowledge and social processes, integrating them and giving meaning to experiences (79). The mutual focus on educational and social processes allows complexity to become part of understanding clinical reality from the beginning of medical training (80). These multiple benefits of ECE have been also demonstrated in a different educational context (81).

1.9. Assessment of medical education

Implementing the conclusions of review articles on specific educational outcomes into real-life application might be challenging. Firstly, the primary means of knowledge acquisition is based on students' engagement, not solely on teaching. Therefore, the overall impact of educational interventions may go unnoticed if only the outcomes are evaluated, since students can influence educational processes (82). Similarly, participants may think that learning certain topics has little impact in reality because they are faced with the contradiction that what they learn and what they experience in clinical practice are dissimilar (83). Consequently, based on participants' diverse perspectives on the experiences, students can be advocates for their own learning by conveying the difference between intended and unintended consequences in medical training (84). Overall, students' opinions and responses can serve as a valid source of information for assessing the 'real' world of medical education.

There are numerous ways to evaluate the learning environment in medical education. In a systematic literature review focusing on ECE by Dornan et al., most data came from formal, quantitative evaluation by students (42%), while a limited amount of data was derived from student assessment (15%), informal opinion (10%) or behaviour-based outcome (5%) (71). In addition, a significant part of the empirical data comes from interviews or self-report questionnaires with participants of medical learning (85).

The importance of workplace-based learning embedded in social interactions has become increasingly valued in medical education, to such an extent that special instruments were developed to assess its quality. Two instruments serve this purpose worldwide: the Dundee Ready Educational Environment Measure (DREEM) (86) and the Manchester Clinical Placement Index (MCPI) (87). DREEM is a 50-item instrument that quantifies students' perceptions of the learning environment climate in five domains. In comparison, the MCPI contains eight items that quantify both the learning environment and the training. The numerical quantities are suitable for creating a profile of the strengths and weaknesses of a given institution, and for comparing student evaluations of the learning environment within an institution or between departments (88). In addition, the free-text options of the MCPI, also provide an opportunity to describe the strengths or areas for

improvement in the workplace, allowing for in-depth, causal relationships to be explored based on student feedback.

ECE is controversial worldwide because this form of learning does not fit into the traditional approach to medical training. This is because students have no biomedical knowledge in this part of their training, and therefore factual knowledge has little role in this learning activity. As a result, preceptors should focus more on the pedagogical and affective components of relationships. This makes ECE difficult for both medical students and preceptors, as the entire process is determined by contextual factors. Therefore, our purpose was to use an international, validated questionnaire to evaluate these contextual factors, compare them with the practices used around the world, and finally translate these experiences to Hungarian medical education.

2. Objectives

The MCPI was developed, validated and is mainly used in English-speaking cultures. Given the persuasive arguments for its wider use, it was timely to explore the transferability of this instrument to cultures where medical education is delivered in other languages. The possibility to assess the quality of the learning environment using an approved instrument is a prerequisite for the internationalisation of medical education, which supports the development of common standards, the investigation of cultural similarities and differences, and their effects on education. Similarly, it promotes the improvement and assessment of educational quality at the international level. Hungary adopted the MCPI early on and has extensive experience of using it in a language other than English.

1. Our aim was therefore to explore the psychometric properties (factor structure and reliability) of the MCPI at a Hungarian medical school, where students used it both in preclinical and clerkship years, as well as in primary care and hospital placements. Capitalizing on the qualitative and quantitative design of the instrument, we chose a mixed-method study design.

On the other hand, although a considerable amount of data is available on ECE programs in Europe and the UK, the qualitative assessment of these programs is limited, and data is scarce in Hungary. Moreover, the medical school where the study was conducted has already introduced ECE into medical training. Furthermore, due to the changes in the context of medicine listed previously, continuous monitoring of the changing needs of the next generations of medical doctors-to-be is essential in order to be able to react immediately to these changes, while continuing to focus on the need to create supportive communities built around real patients.

2. Therefore, in the next study, we aimed to explore one of the most critical transitions, the characteristics of clinical experience in the preclinical years by analysing the free-text responses of the MCPI, revealing the key components that facilitate the acquisition of clinical experience in the early phase of medical training and provide a context in which medical students can safely develop their professional identity.

In addition to evaluating and interpreting our data in an international context, our purpose was to use the results of the MCPI also for institutional development. The results of the questionnaire enabled objective comparison of preceptors' work, reinforcement of best practices and improvement of the quality of education. Similarly, continuous monitoring of students' preferences based on their responses made it possible to adjust the framework of practicals accordingly.

3. Methods

3.1. Context

Two single-center, observational studies were conducted between the academic years 2019 and 2024 at Semmelweis University in Budapest. The first study for the validation procedure was a cross-sectional study in 2019 and 2021, focusing on real patient learning across the entire medical training program (89). In addition, the second study was a cross-sectional analysis that evaluated the characteristics of early clinical experience using data collected in 2019 and between 2021-2024 (90). The University's Regional Research Ethics Committee approved the studies with ethical approval number 243/2019.

3.2. Procedure

In 2019 second-year medical students – participants in the mandatory ‘Introduction to Clinical Medicine’ practicals – completed the online version of MCPI in Hungarian, including the name of their preceptor. In 2021, data collection was extended to fourth-year (family medicine) and fifth-year (intensive therapy and anaesthesiology) medical students, and the metadata was supplemented with self-reported gender, age, and academic year. In addition to these years, the ‘Introduction to Clinical Medicine’ course, which at that time was a mandatory practical in the first-year of medical training, was also evaluated between 2021 and 2024 using the MCPI. The questionnaires were circulated online via the university’s official mailing system at the end of the course (preclinical and fifth-year students) or on paper at the final lecture after the fourth-year family medicine practical. The invitation letter accompanying the questionnaire stated that the Department of Family Medicine, where the students had just finished their placement, intended to collect feedback on how their preceptors and the community of practice supported their learning on real patients, with the dual aim of improving the quality of workplace learning and conducting research on how to do it most effectively in the future. All enrolled students were invited to fill out the questionnaire. The quantitative items were mandatory to complete, while free-text answers were optional. Preclinical students were motivated to participate by the chance to win three stethoscopes in a prize draw, while students in the clinical years were not incentivised in this way. The year 2020 was excluded from the survey because the COVID-19 pandemic made it impossible to conduct the study under regular circumstances.

3.3. Characteristics of real patient learning in different settings of the study samples

The ‘Introduction to Clinical Medicine’ placement was a small-group (7-10 students) course in which first-year medical students took the medical histories of patients selected by an experienced family medicine preceptor in the surgery, on a weekly basis, for one semester. The patients’ permission was asked for a group of medical students to take their history in the presence of their general practitioner (GP) preceptor, who invited the patient to contribute to the practical. Students received in advance a written, OSCE-based history-taking guide translated from English to Hungarian, and preceptors supported students’ individual participation in the practice. The aim was to immerse students in the clinical environment and enable them to acquire skills that would allow them how to approach patients and take medical history in later years of their clerkship. Due to the novelty of the course only pre-trained preceptors could participate in teaching. In the fourth year, students participated in a five-day ‘Family Medicine’ rotation, including two full-time GP placement days, during which they observed one-on-one clinical work of a GP preceptor. Fifth-year students had a three-weeks long ‘Intensive Therapy and Anaesthesiology’ placement, where they were instructed in small groups to complete bedside activities in an Intensive Care Unit, where they assessed patients according to the Airway, Breathing, Circulation, Disability, Exposure (ABCDE) assessment method.

3.4. Participants

Numerical data provided by students in 2019 and 2021 were used for the first, validation study. The validation study was a cross-sectional study, and 748 student responses were included in the analysis. The number of participants by academic years was as follows: 308 first-year, 190 second-year, 186 fourth-year and 64 fifth-year medical students. For the second, exploratory study a total of 883 free-text student answers were provided between 2019 and 2024 for the purpose to evaluate early clinical experience. The response rate in the studies ranged from 21.03% to 52.82%. Participation was anonymous and voluntary in both studies.

3.5. Outcome measurement

The Manchester Clinical Placement Index (MCPI) is a self-report instrument developed by Dornan et al. (87) to measure the quality of support to students' real patient learning in communities of practices. The theoretical and empirical background of the instrument is grounded in the ExBL theory and is applicable in both hospital and primary care settings. The instrument reveals two factors: five items evaluate the learning environment (leadership, reception, people, facilities and organisation) and the remaining three assess the quality of training (instruction, observation and feedback). Each item of the questionnaire starts with a definition, followed by a numerical rating on a seven-point Likert scale. The extreme values on the Likert scale range from 0 to 6, where 0 means strongly disagree, 3 means neither agree nor disagree and 6 means strongly agree with the item. In addition, students can add free-text comments on the strengths of the workplace learning or how teaching could be improved in relation to the given item. The instructions are intentionally formulated in a positive manner in both cases. The numerical data can be summed up to obtain the total score; a reliable measurement can be made using more than 10 responses. In addition, the learning environment subscale can be calculated by adding the scores for leadership, reception, people, facilities and organisation, multiplying by 100 and dividing by 30%. The training subscale can be calculated by adding the scores for instruction, observation and feedback, multiplying by 100 and dividing by 18%. The instrument was translated in a rigorous, multi-step process in repeated consultations with the original author. We formulated an additional item on the clarity of the instrument, using a yes/no answer and a free-text option as well: "Did you experience any difficulty in interpreting any of the questionnaire items while filling out the instrument?". The quantitative elements of the MCPI were mandatory, while the free-text sections were optional. The instrument can be found in Supplement 1.

3.6. Statistical analysis

For the factor analysis of the MCPI, first descriptive statistics (mean, standard deviation, skewness, and kurtosis), internal consistency and multivariate normality (Mardia's coefficients) were calculated (91). Internal consistency was measured using Cronbach's alpha with a minimal reliability coefficient criterion of 0.7 (92).

To determine the scale's internal structure, we took a two-step approach. First, we explored the factor structure and factor loadings of each item using exploratory factor analysis (EFA), and then we subjected the complete dataset to confirmatory factor analysis (CFA). First, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was used to examine the strength of correlation between the variables, taking 0.8 as our criterion of acceptability. We used Bartlett's test of Sphericity to examine whether the correlation matrix was an identity matrix, and we accepted it if that was not an identity matrix ($p < 0.05$) (93). Since our data were not normally distributed, we performed a polychoric correlation matrix on the ordinal data and used weighted least squares mean–variance adjusted (WLSMV) parameter estimator for factor analysis.

The number of dimensions to be extracted was defined by parallel analysis, in which the progressive eigenvalues of the given data matrix were compared with the eigenvalues of a simulated data matrix using random data of the same size (94). As recommended by O'Connor (95), 500 random datasets were generated, and the 95th percentiles of the eigenvalues from these random datasets were compared with eigenvalues of the actual dataset. If the eigenvalue of the actual data was greater than the corresponding eigenvalue of the random data, the number of factors was retained (95, 96). The latent structure of multivariate data was also identified and visualized using the Gaussian graphical model (97) and a community detection algorithm for weighted graphs (98). Exploratory Graph Analysis (EGA) was used to model the inverse of the variance–covariance matrix via the graphical lasso (*glasso*) regularization method (99).

Confirmatory factor analysis (CFA) was performed by using a robust estimator (maximum likelihood estimation with robust standard errors and a mean- and variance-adjusted, MLMV), which appropriately corrects for standard errors of parameters. Model fit was evaluated by calculating chi-square, degrees of freedom, root mean square error of approximation ($RMSEA < 0.06$), comparative fit index ($CFI > 0.95$), and Tucker-Lewis Index ($TLI > 0.95$) (93, 100).

We calculated explained common variance (ECV), which is a multidimensionality index attributable to the general factor and each of the two group factors, the proportion of total common variance explained by a given factor. For the general factor, this is simply 'ECV'. For specific factors, the ECV_S computes the strength of a specific factor relative

to the total explained variance of all items, even those not loading on the specific factor (101).

Likewise, Coefficient Omega (ω) was calculated, which is a model-based estimate of the internal reliability of the multidimensional composite. It measures the proportion of total score variance which can be attributed to all common factors. For the general factor, all items are considered; for specific factors, Coefficient Omega Subscale (ω_S) measures the proportion of subscale score variance that is attributable to the specific factor alone after controlling for the general factor. Coefficient Omega Hierarchical (ω_H) “reflects the percentage of systematic variance in unit-weighted (raw) total scores that can be attributed to the individual differences on the general factor, when ω_H is high (>0.80), total scores can be considered essentially unidimensional.” The omega hierarchical subscale (ω_{HS}), “is an index reflecting the proportion of reliable systematic variance of a subscale score after partitioning out variability attributed to the general factor” (102).

Assessing the unidimensionality at the item level, individual explained common variance (IECV) was calculated, which measures the extent to which an item’s responses are accounted for solely by variation in the latent general dimension (103). Selecting items with large loadings on the general factor and IECV greater than 0.8 or 0.85 typically yield a fairly unidimensional item set that reflects the content of the general dimension. SPSS 17.0, FACTOR (104), Shiny app2 and Mplus Version 8 (105) were used for all data analysis.

The quantitative data of the ECE study was also analysed, descriptive statistics were calculated, which allowed comparison with the data of the validation article.

3.7. Qualitative analysis

Qualitative analysis was carried out in both studies. During the validation procedure, preliminary assessment showed that the correlations between items 5 (observation) and 6 (feedback) were high, suggesting that multicollinearity could be a problem (93). Therefore, we focused on explaining the relationship between participants’ numerical responses to the ‘observation’ and ‘feedback’ items, with the aim of exploring how participants’ responses contributed to this phenomenon through the wording of the instrument. The authors of the first study systematically read all free-text responses,

identified blocks of text related to ‘observation’, ‘feedback’ and the relationship between the two, and assigned them provisional codes. The authors compared the coding patterns, which we then discussed with experts in the field and agreed on a common framework. We then examined the codes, identified themes that organised the codes into higher-level concepts that explained how participants’ comments constructed the relationship between observation and feedback, constantly compared their interpretation with the original data, and finally agreed on a final interpretation (106).

The early clinical experience study focused on the characteristics of preclinical students’ learning from real patients in clinical settings and the influence of training on their learning. The framework was provided by the AMEE on workplace learning (65), which defined the MCPI as an instrument to evaluate experience-based learning in clinical setting. Students’ free-text responses on the MCPI provided textual material that was subjected to latent construct analysis (106). We (SZ.F. and A.E.) repeatedly reread the collected text responses and labelled the data segments with descriptive codes. We then formed interpretative codes based on the content and interrelationships and developed a conceptual model in continuous consultation with Professor Tim Dornan. Finally, we created the overarching themes of the dataset. At the end of the process, we reread the data to ensure that the themes were sufficiently grounded in the responses. We selected free-text responses that were strongly representative of the overarching themes and quoted them verbatim in the Results section. Other responses supporting the interpretation are referenced in the text (year number and response number) and can be read in full in Supplement 2.

4. Results

We approached the Hungarian use of the MCPI from two different angles: one focused on the validity and reliability of the instrument in a cultural context different from the original English-language setting. The other aim targeted to explore constituents that made the learning process of early clinical experience safe and effective.

4.1. Quantitative analysis

4.1.1. Descriptive statistics

In the validation procedure's descriptive statistics, the mean item scores ranged from 4.57 ± 3.31 (item 6 – feedback) to 5.46 ± 0.94 (item 1 – leadership), and all the items showed positive asymmetry and platykurtic distribution (Table 1). The univariate skewness and kurtosis of several items fell outside the acceptable limit (± 2.00), indicating that the assumption of normality was violated. The estimate of multivariate kurtosis also indicated deviation of the item scores from multivariate normality ($p < 0.05$).

Table 1. Means, standard deviations of the MCPI items in the validation study. (89)

	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
1. Leadership	5.46	0.94	-2.60	8.77
2. Reception	5.32	1.34	-2.10	4.60
3. People	5.15	1.65	-1.83	3.20
4. Instruction	4.93	2.10	-1.53	1.83
5. Observation	4.72	3.32	-1.44	0.92
6. Feedback	4.57	3.31	-1.18	0.30
7. Facilities	4.87	1.84	-1.26	1.29
8. Organisation	5.16	1.51	-1.78	3.25

M = Means, *SD* = Standard Deviation

Therefore, the polychoric correlation and weighted least square mean and variance adjusted (WLSMV) parameter estimator was considered suitable for performing factor analysis (Table 2). The correlation matrix of all items showed that most of the items correlated strongly. The correlations between items 5 (observation) and 6 (feedback) were nearly 0.80, which suggested multicollinearity. The reliability tests on the measures for

Learning environment ($\alpha = 0.80$), Training ($\alpha = 0.82$) and Total scale ($\alpha = 0.86$) had acceptable Cronbach's alpha coefficients. The subscales were strongly and positively correlated ($r = 0.62$).

Table 2. Polychoric correlations of the MCPI items. (89)

	1	2	3	4	5	6	7
1. Leadership							
2. Reception	0.54						
3. People	0.65	0.59					
4. Instruction	0.56	0.47	0.50				
5. Observation	0.58	0.49	0.52	0.63			
6. Feedback	0.58	0.55	0.54	0.66	0.79		
7. Facilities	0.45	0.47	0.46	0.40	0.37	0.44	
8. Organisation	0.62	0.61	0.63	0.55	0.58	0.59	0.58

In the ECE study, the mean item scores ranged from 4.74 ± 1.74 (item 6 - feedback) to 5.49 ± 1.07 (item 1 - leadership), similarly showing a positive asymmetry and platykurtic distribution (Table 3). Since the distribution of the data was similar to findings from the first study, they were not further analysed statistically. Instead of quantitative analysis, we focused on qualitative evaluation based on students' written responses.

Table 3. Means, standard deviations of the MCPI items in the ECE study.

	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
1. Leadership	5.49	0.95	-2.69	9.30
2. Reception	5.45	1.07	-2.59	7.60
3. People	5.27	1.26	-2.15	4.73
4. Instruction	5.04	1.41	-1.63	2.13
5. Observation	4.87	1.76	-1.62	1.56
6. Feedback	4.74	1.74	-1.39	0.93
7. Facilities	4.99	1.33	-1.42	1.75
8. Organisation	5.21	1.21	-1.84	3.38

M = Means, *SD* = Standard Deviation

4.1.2. Qualitative analysis supporting the factor analysis

In order to clarify the statistical observation of multicollinearity between ‘observation’ and ‘feedback,’ we examined participants’ free-text responses about the strengths and weaknesses of the two variables. In the responses, the components of learning, namely observation and feedback, were often used as interchangeable categories. This was probably due to the dynamics of clinical work, where continuous observation also acted as a form of feedback and where close observation was required for meaningful feedback (2021/149). In addition, students often answered these specific questions as being related to learning in general, which made the latter analysis ambiguous.

Observation

Sixty-six of 171 answers on observation referred to feedback, either explicitly by using the term ‘feedback’, or implicitly by using a synonym or describing behaviour that conformed to the term feedback. The texts related the term ‘observation’ to preceptors’ views on the students’ work and its correction, as well as to the support of students’ learning. Some examples included: *“If I did not complete something well or correctly, they told me and therefore I was able to learn it.”* (2019/140) *“I could do the examination with more confidence because I knew that if anything went wrong, they would correct it in the right way.”* (2021/34) *“I continuously received feedback”* (2021/145) *“We were supervised while we were doing the tasks; possible mistakes were corrected by our preceptor.”* (2019/121) *“The doctor observed us and gave feedback.”* (2021/21) *“She (the preceptor) observed the whole process, and after the patient left, she provided feedback about the flaws and deficiencies in taking the medical history.”* (2019/70) *“She didn’t intervene, she waited to give the feedback until the end of the interview, and we discussed afterwards what needed to be improved.”* (2019/132)

Feedback

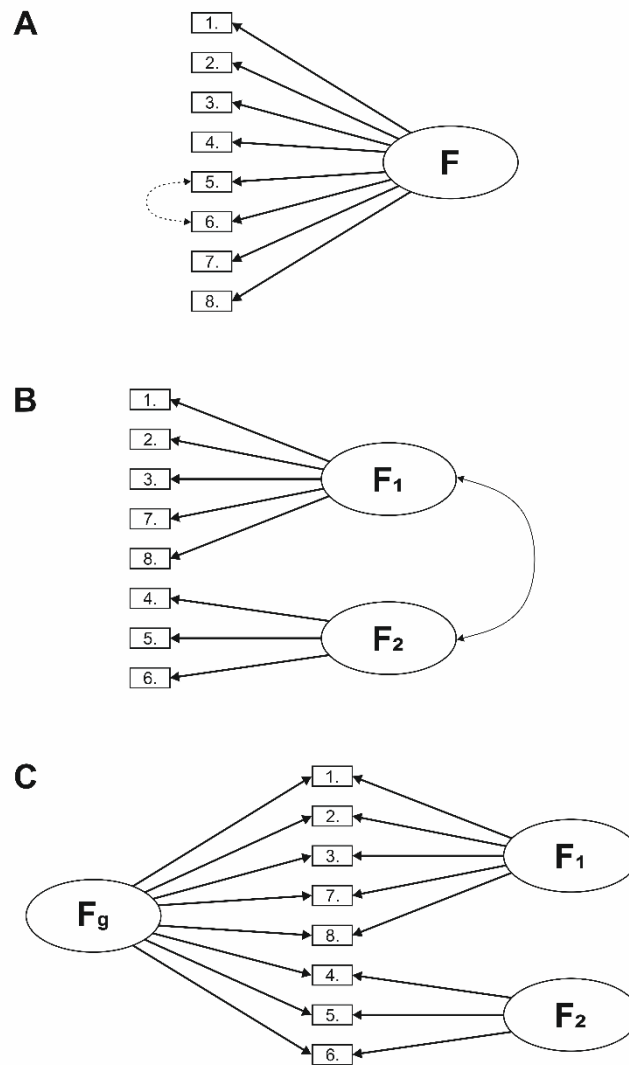
On the other hand, only 10 answers on feedback did not refer to observation. These 10 exceptions were specifically related to the nature of feedback: it was personal or stimulating; the student felt it was warranted; or it helped them learn. The remaining 161 responses explicitly linked feedback to observation of students’ skills in taking histories. Students commented on the timing of feedback (in front of the patient or afterwards) and

whether it was given to a whole group or individuals. Examples included: *“After the patient had left, we discussed which answers we should pay extra attention to and (the preceptor) repeated several times the useful questions we had asked.”* (2019/92) *“(Our preceptor) could always point out both positive and negative things related to our work, while keeping us motivated.”* (2019/124) *“(Feedback) was given not in the presence of the patient but after they had left, therefore we were not humiliated in front of the patient at the beginning.”* (2019/105) *“We had (feedback) in general during every session, but it was common to receive personal feedback as well.”* (2019/107) *“We always discussed each patient’s case with the preceptor and the group.”* (2019/132) To receive personal feedback on *“what we did well (during history taking) and what could be improved.”* (2019/130)

4.1.3. Evidence of the factorial validity of the MCPI

Bartlett’s statistics and Kaiser-Meyer-Olkin (KMO) tests showed the adequacy of the polychoric correlation matrix to the factor model ($\chi^2(28) = 2893.6$; $p < 0.001$; KMO = 0.906). Only one factor with eigenvalues greater than one emerged (eigenvalue: 4.86, explained variance: 60.9%), and the parallel analysis also confirmed the existence of a unidimensional structure.

Since the scoring method of the original article of the MCPI suggested a bifactor model (87), where a general factor and two subscales were present, we complemented the EFA by performing CFA with different models: (A) unidimensional, (B) two dimensions with correlation, and (C) bifactor model (Figure 1).



1. Figure. Different factor models of the MCPI. (A) Unidimensional; (B) Two dimensions with correlation; (C) Bifactor model. Fg = General Factor, F1 = Learning environment, F2 = Training. (89)

Overall model fit of the MCPI

First, we presumed a one-factor model based on the results of EFA (Figure 1A). Second, we tested a two-factor model (Learning environment and Training), in which the two factors were distinct but correlated (Figure 1B). Third, based on the previous data, we examined a bifactor model, according to which the MCPI comprises a general factor (Fg) that explains all items, and two factors (Learning environment (F1) and Training (F2)) that account for the influence of the domains on the general factor (Figure 1C).

As presented in Table 4, the fit of the unidimensional factor structure was adequate, although lowest among all possible models. The modification index suggested that adding the error covariances between items 5 and 6 would improve the model fit. Two dimensions with correlation showed acceptable fit, but slightly lower than the modified unidimensional model. The bifactor model provided an excellent fit to the correlation matrix.

Table 4. Goodness of fit statistics for all tested measurement models of the MCPI.
(89)

Model	χ^2	df	CFI	TLI	RMSEA (90% CI)	WRMR
Unidimensional	216.86	20	0.956	0.939	0.122 (0.111, 0.141)	1.220
Modified unidimensional	40.12	17	0.995	0.992	0.047 (0.028, 0.065)	0.486
Two dimensions with correlation	52.80	19	0.992	0.989	0.053 (0.036, 0.071)	0.575
Bifactor model	16.24	12	0.999	0.998	0.024 (0.000, 0.050)	0.284

χ^2 = chi square, df = degree of freedom, CFI = Comparative Fit Index, TLI = Tucker – Lewis Index, RMSEA = Root-Mean-Square Error of Approximation, WRMR = Weighted Root Mean Square Residual.

Results of the CFA

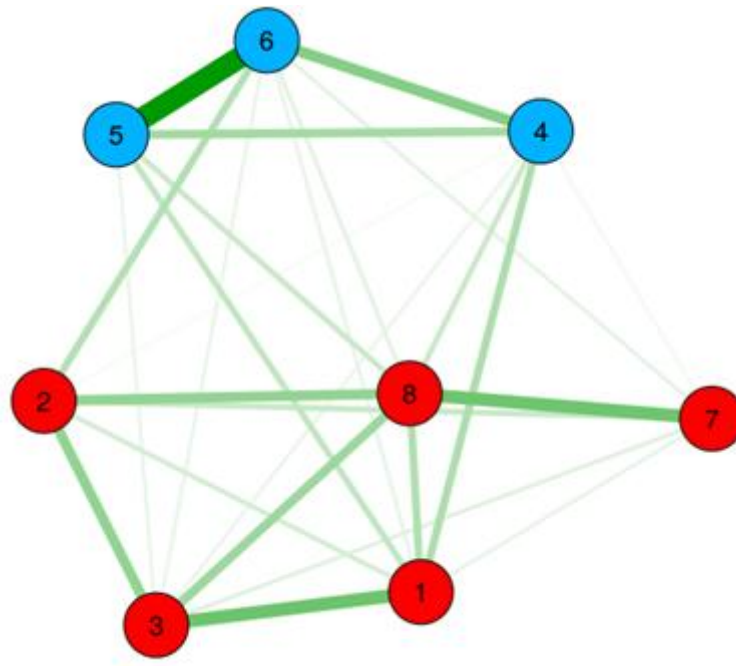
It can be seen in Table 5, that the pattern of the results suggested a unidimensional model, with all items loading strongly on a single factor (factor loadings ranging from 0.63 to 0.83). Explained common variance (ECV) for the general factor was 0.82, indicating that the general factor explained a high percent of the common variance. In contrast, the ECV was low for the two specific factors (0.04 and 0.14), indicating that these factors explain

a lower proportion of the items' common variance. As seen in Table 5, ω value was 0.93 for the general factor, indicating that variance in the score was due to a single factor. The high value of ω_H for the general factor (0.87) indicated that the total scores could be considered unidimensional. The low ω_H values for the specific factors (0.01 and 0.28) tended to confirm the unidimensional factor structure. Overall, the high general ECV values and the high value of ω_H , indicated unidimensionality, which was consistent with the results of the Exploratory Graph Analysis (EGA) (Figure 2).

Table 5. Confirmatory factor analysis: standardized loadings, explained common variance and model-based reliability estimates of the MCPI. (89)

	Unidimensional	Bifactor CFA			IECV
		F _g	F ₁	F ₂	
1. Leadership	0.79	0.82	-0.23		0.93
2. Reception	0.74	0.73	0.13		0.97
3. People	0.77	0.77	-0.01		1.00
7. Facilities	0.63	0.60	0.29		0.81
8. Organisation	0.83	0.82	0.28		0.89
4. Instruction	0.66	0.66		0.33	0.80
5. Observation	0.68	0.68		0.54	0.61
6. Feedback	0.72	0.72		0.55	0.63
ω		0.93	0.88	0.88	
ω_H		0.87	0.01	0.28	
ECV		0.82	0.04	0.14	

CFA = Confirmatory Factor Analysis, ECV = Explained Common Variance, IECV = Individual Explained Common Variance, F_g = General Factor, F₁ = Learning environment, F₂ = Training, ω = Omega, ω_H = Omega Hierarchical.



2. Figure. Gaussian graphical model of the MCPI items. Colour groupings correspond to higher order dimensions of Learning environment (red items) and Training (blue items). (89)

4.2. Qualitative analysis of the early clinical experience

The qualitative analysis of the ECE context revealed three main themes: the relevance of context in early clinical experience, the specificities of learning in clinical setting, and role conflicts during learning.

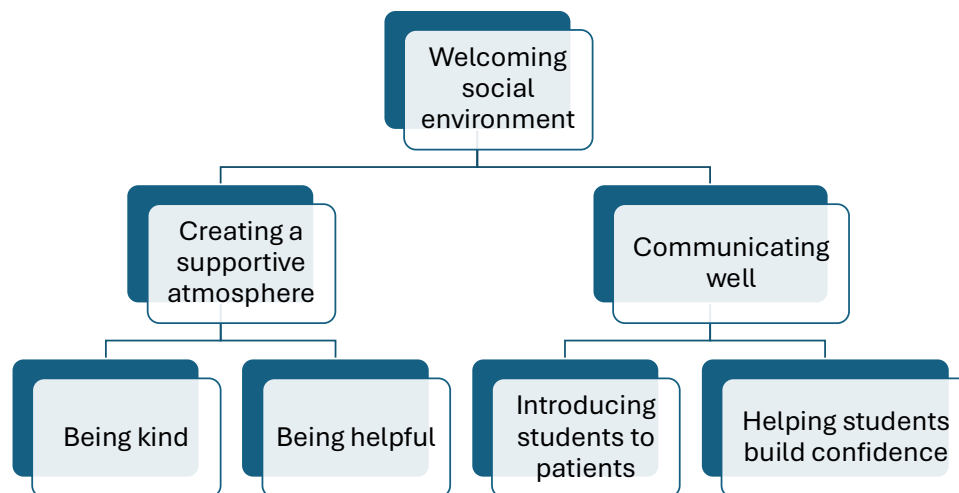
4.2.1. The relevance of context in early clinical experience

Establishing a welcoming social environment

The clinical environment was unfamiliar to the novice medical students, so the warm, welcoming reception they experienced from the preceptor and the staff was particularly important in helping them to feel safe and be able to complete the task assigned to them.

"Everyone was very kind and helpful to us, from the porter to the cleaners, the doctors who taught us, etc. It was nice to be in such an atmosphere. Personally, I felt that we, the students, were respected and that they were happy to have us there." (2022/118)

The preceptor created a welcoming, supportive atmosphere by being kind and respectful to the learners. By introducing them to the patients, the preceptor eliminated the tension of the unfamiliar situation (2021/81). The way the preceptor instructed the students in the presence of the patient helped to build the students' confidence that they were able to perform the clinical task and also increased the patients' trust in them (2022/175). The preceptor's continuous, supportive presence sheltered learners (2024/48). Likewise, the patients were in a familiar environment, which assured interactions with the students (2021/105). All these factors contributed to a welcoming social environment that made the students feel as members of the community (Figure 3).



3. Figure. The constituents of a welcoming social environment. (90)

The role of organisation as a framework for learning

As students would otherwise only study theoretical subjects in the first two years of medical training, the surgery, as a site for clinical work, presented an inspirational learning environment (2022/36) where the focus was entirely on students (2022/124). Even the location of the practicals was meaningful to the students, who were disappointed when the practical was held in a seminar room instead of a medical office (2023/42). In contrast they were enthusiastic about being in a real clinical setting (2021/100).

“The classes were held in a doctor's surgery, so we could really see how the surgery is run on a day-to-day basis, what kind of equipment is available, etc. It was nice not to sit in a school desk and learn from a textbook.”

(2022/36)

The structure conveyed a sense of predictability. The practicals always started and ended on time (2019/68) and every practical had a predefined objective (2022/208). Besides that, students were aware of the structure of the course (2019/138) and how autonomous work would be carried out during the semester (2019/188). These were the components of the framework that helped students to be able to focus their attention on the clinical task.

Learning in real clinical setting was new and unfamiliar for the students, so it was difficult for them to accept that the characteristics of learning in clinical practice were different from learning in school. Some students commented on how uncomfortable it was to sit during the practicals and how little they were able to take notes (2019/47), while others embraced that learning medicine requires new forms of studying (2022/118/2). Students focused on the external factors as their first encounter with the real world of medicine, attributes (white coat, stethoscope) were seen as means of participation in clinical practice (2021/9 and 2021/42). Learners valued the opportunity to learn simple clinical skills; these activities were seen as part of integration into real clinical work (2021/70 and 2024/60).

4.2.2. Specificities of learning in clinical setting

The preceptor had a central role in the placements, connecting the students with the clinical environment, being the host in this new world. A collegial and calm atmosphere created a safe space where students ventured to step out of their comfort zone and practice with the patient in the presence of the group and the preceptor. They knew that any mistakes they made would not cause harm and would be corrected.

"She watched us closely but only intervened when absolutely necessary. This gave us the opportunity to try things out and get closer to experiencing a 'real-life' situation, but at the same time it was reassuring to know that we weren't left on our own..." (2023/93)

Clinical workplace learning had two timeframes. The first, longitudinal framework involved participation in the entire complex activity, and the second, occasional framework was about performing the actual clinical skill. Students were active participants, and the preceptor facilitated the development of new abilities appropriate to their future medical roles (2019/70). Effective learning of the entire complex activity required the following specific steps: the first step was to observe the preceptor at work. This was followed by rehearsing, working in a supportive climate under supervision (2022/175) and finally, solving the task autonomously with the continuous support of the preceptor (2022/78). These steps led to the acquisition of the required practical knowledge, which made learners capable of performing a specific professional activity in a clinical setting (2024/48).

"... we received detailed theoretical training, which we were able to try out immediately afterwards. The instructions were clear and easy to follow, and we received feedback from the preceptor on the instructions' application after the patient left." (2019/70)

The first step of performing the actual clinical skill began with the preceptor giving clear instructions that made the students aware of what they were supposed to do (2019/68/2). The next step was for students to participate in the activity while the preceptor observed them (2019/92). The students were predominantly monitored continuously, and when this did not happen, the learners highlighted the lack of observation (2019/165). The constant observation and supportive presence of the preceptor facilitated the students to complete activities that they could not have done on their own. To support their development, students required collective discussion and feedback. The fundamental importance of feedback was to reinforce good practices and to correct mistakes (2019/130), but learners' development was best supported when feedback was provided in a stimulating and supportive way in an emotionally safe environment (2022/55 and 2024/56).

The constituents of learning were flexible, as they were interrelated in real participation. There was a mutual relationship between the learners and the preceptor, so that even when students were engaged in the actual clinical activity, they were constantly monitoring how the preceptor would respond, and similarly, the preceptor's observation and feedback constantly formed their activity (2024/48 and 2021/81/2). The complexity of dynamic

interactions during these encounters was displayed, and not only practical and intellectual skills were developed, but the related emotional aspect was also introduced.

It caused tension to understand the concept of history taking without biomedical knowledge. This gap required a context in which support and human relationships came to the fore, and therefore emotional safety was essential. Students felt uncertain in these encounters because they assumed they had neither the relevant knowledge nor the experience for clinical work (2021/153). Moreover, student groups could be competitive (2022/9) where openness could be considered as a weakness. Therefore, emotional safety was a crucial factor in early clinical experience, the preceptor's role was to create and maintain a warm, collegial atmosphere (2024/18). Reflecting on students' emotions and thoughts was inspiring because of the novelty of the experience (2019/174 and 2019/174/2), as it could help to relieve the potentially developed tension. A balanced focus on both professional and personal (humane) elements helped to develop both professional identity (2022/8) and personal development (2023/43).

"The preceptor tried to get to know us during the practicals and paid attention to how we experienced each situation after every practical. Every week, he asked us if we had any new questions about the previous week's patients." (2019/174)

"We were able to learn the steps of taking a medical history from our own mistakes and began to acquire a medical way of thinking. The Teacher always corrected us, gave us advice, and we were able to evaluate our own performance and our peers too." (2022/8)

The preceptor was a meaning-maker who allowed insight into this new world (2022/68), who enriched pure theoretical knowledge with the humane aspects gained from clinical experience and from interactions (2023/51), with the essential abilities required for professional identity formation (2024/111). This partnership was shaped by the interpersonal connections (2019/22) and with the preceptor's support, students were able to focus on the ill person (2023/31), even when the questions were centred around the illness. These factors enabled the patient to become a font of information (2023/34), a learning partner, and a source of humanity in the physician-patient relationship (2023/66).

"We discussed various tasks, not only their practical aspects, but also their humane side. How to treat patients with the utmost attention and empathy, how important communication is in order to make a successful diagnosis and make patients feel that they are in good hands." (2023/51)

"Our preceptor constantly made sure that we gained new skills by the end of the practicals, both professionally (e.g. practising Latin medical terms) and personally (e.g. being polite and empathetic towards patients)." (2024/111)

4.2.3. Role conflicts during learning

Early clinical experience revealed a conflict between the professional and lay role, as well as between the actual and desired role in the triad of preceptor – student – patient. The preceptor and the patient were experts in relation to the disease, as the clinician knew the clinical features of the disease (diagnosis, therapy, prognosis), while the patient knew the impact of the disease (own life experience). The students were aware of neither. Learners sometimes tried to alleviate this uncertainty by emphasising their future role and mimicking professionalism (2022/23) or repeating automatic questions (2019/125). Without clinical knowledge and person-centredness, the repetition of previously learnt questions (2021/173) generated role conflict in the students (2022/33), which eventually led to detachment from the patient (2019/51).

"We asked the questions in the right order and thoroughly, but in the end, didn't come together with us because we lacked the necessary basic knowledge. So, I felt it was a bit pointless." (2021/173)

"It taught me patience, because in a medical career we have to spend a lot of time listening to people rambling all over and then draw rational conclusions from that." (2019/51)

The attitude of first-year medical students was lay, occasionally childlike. This openness was valuable in clinical encounters, as it was grounded in person-centredness. However, as they lacked clinical experience, they found it difficult to relate to themselves as future physicians.

"... patients were able to open up more when it came to personal issues, and I think their anxiety was also reduced, as in the eyes of elderly people we look more like their grandchildren, while their doctor is a person of high standing." (2023/85)

Maintaining this humane approach required continuous support from the preceptor (2023/18). The students' inexperience resulted in uncertainty and role conflict (2019/10). The preceptor's active moderation was needed to keep the students' focus on the essence of the interview, while emphasising the value of the real patient relationship.

"Personally, I think that as first-year students, we are still a long way from being able to establish any kind of relationship with a patient, and even the invited aunties and uncles were unable to handle the situation appropriately. We do not yet have professional knowledge, so the topic was often diverted, and the conversation had no medical relevance (but we learned how to bake rye bread, play football, do bookkeeping, cook and prepare a diabetic diet), so unfortunately, I often felt that I was just wasting my time in the surgery." (2022/133)

Preceptors also faced tension in clinical teaching. As clinician teachers, they had to find a balance between their clinician and teacher identity. The preceptor sometimes approached the situation as a clinician without understanding the specific circumstances of first-year students (2019/136 and 2023/22) or gave information for the learners that they were unable to place in a professional context.

"...I have often found that teachers are not aware of where the medical students they are working with are in their curriculum (e.g. my preceptor usually asked the patient to list the medications they were taking, which resulted in us hearing 15 unfamiliar drug names that we could not write down, and the teacher only occasionally revealed what the medication was prescribed for)." (2019/22/2)

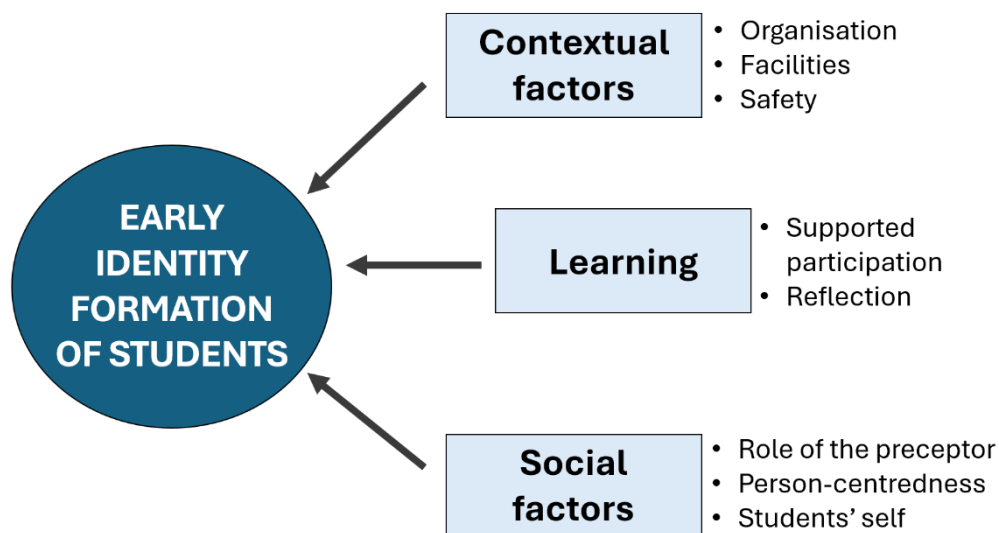
In addition to the lack of professional focus, hierarchy and routines based on everyday habits (2019/167), or evoking negative emotions (2022/204) could also have resulted in emotionally stressful situations. Similarly, detachment from students could have led to the preceptor sharing confidential information with students without an appropriate

framework, which could also have caused discomfort for the student and the patient (2019/37).

"Ideally the doctor should give you a thinking pattern to follow, which you can use to start thinking and asking the patient specific questions. In contrast, we were thrown in at the deep end without any preparation, and we found it difficult to figure out exactly what to ask." (2019/167)

"There was a patient who did not want to get all the detailed information about her condition, but the doctor did not tell us about this in advance, so there was a risk of giving her information through our questions that she did not want to know." (2019/37)

Overall, in our ECE setting, contextual factors provided the framework for learning, the preceptor's observation and feedback formed the background for the development of knowledge and attitude, while preceptor's engagement supported the formation of students' identities (Figure 4).



4. Figure. The constituents of students' early identity formation.

5. Discussion

5.1. Evaluation of the learning environment in medical education

5.1.1. Factor structure of the Hungarian version of the MCPI

The preliminary factor analysis of the Hungarian version of the MCPI showed that the instrument's factorial structure is best explained by a bifactor model, however, further statistical analysis supported the use of a strong general factor instead of two subscales. In conclusion, from a statistical viewpoint, the MCPI may be best conceptualised as a unidimensional instrument, whose subscale scores are primarily determined by respondents' overall perception of their learning environment.

Measurement invariance assesses the psychometric equivalence of a construct across groups or over time. Measurement invariance suggests that a construct has an identical structure and meaning to different groups or on different measurement occasions within the same group, so that the construct can be tested across groups or over time (107). The MCPI was originally developed in an English-language context, and only limited data is available on its use in other languages (108). In the English-language undergraduate medical educational context, the principal component analysis of the MCPI revealed a bifactor structure in both hospital and community placements (87). The subscales identified in the English-language samples did not prove to be robust enough in the Hungarian context to statistically distinguish the quality of learning environments from the training provided within those environments. The variance among the items of the MCPI can be best explained by a single general learning environment factor (F_g), that reflects the common variance across all items. Additionally, there were two sub-factors: learning environment, which included items of leadership, reception, people, facilities and organisation; as well as training, which included items for instruction, observation and feedback. This interpretive model captures some unique common variance among clusters of items.

5.1.2. Interpreting multicollinearity using mixed-method design

The factor analysis suggested covariance among the items of the Hungarian version of the MCPI. We wanted to obtain a tangible explanation for the multicollinearity we experienced between observation and feedback. Multicollinearity is a statistical

phenomenon which appears when two or more independent variables in the regression model are correlated with each other, making it difficult to isolate the individual effect of each variable (109). From an educational viewpoint, both instruction and feedback depend on close observation (110), as learning is a cyclical process in which credible feedback is based on personal observation and explicit standards, with the constant intention to re-observe (111).

The free-text answers provided by students identified that few students regarded observation and feedback as distinct entities. The majority of the free-text answers to observation item related to preceptors' feedback on student performance, suggesting that these two behaviours are inseparable, at least in Hungarian students' experiences. However, previous research with the MCPI in a UK setting revealed a cultural difference, as some preceptors gave feedback without directly monitoring students' performance in clinical tasks, as it was considered that direct observation of students would be inappropriate as it would have made clinical practice artificial. In addition, the context was different, as the study population in the trial consisted of medical students in their clerkship years (112). According to our research findings, in the preclinical years, the expert community and the welcoming social context are highly valued by the students who neither have the clinical knowledge nor the experience to independently perform the task of taking the medical history of the patient.

The applicability of an instrument can be verified in multiple sites, as it makes different settings comparable, but the application and interpretation of these instruments might be influenced by culture and language (113). Our analysis demonstrated that the MCPI is applicable as a unidimensional instrument in the Hungarian context. There may be contextual differences in its use, but these only become apparent through detailed evaluation.

5.1.3. The scope of the learning environment evaluation

Students' evaluation of the curriculum in action in a student-centred, objective way can be an important factor for improvement (114). The evidence is mixed as to whether high-quality medical education leads to better knowledge or better performance assessment outcomes (115, 116). On the other hand, the impact of the educational climate, as a positive learning environment, clearly facilitates learning in the clinical context (117). In

the early 2000s, the importance of the learning environment as an active component of learning became apparent, and its evaluation was considered valuable in terms of monitoring and supporting students' experiences in authentic medical workplaces.

Numerous instruments were designed for assessing the learning environment in medical education. Based on a systematic literature review from 2012, nine instruments were found to be applicable in the clinical educational environment, however, based on the results of the summary, only three questionnaires - MSLES, MSEQ and DREEM - focus on the learning environment in undergraduate medical education. Of these three questionnaires, the current application of the MSEQ and MSLES is limited. Overall, the use of DREEM was proposed (118). Likewise, in another systematic literature review, DREEM was also considered as an instrument to be applied in undergraduate medical education (119).

DREEM was developed in parallel with the rapid changes in medical training around the 2000s, as a result of cross-sectional assessment of evidence, comprehensive literature research, and international collaboration of nearly 100 health profession educators from around the world. DREEM is a 50-item instrument with quantitative properties, each of the 50-item consisting of a 5-point Likert scale. DREEM assesses undergraduate medical education using five subscales: I) Students' perception of teaching, II) Students' perceptions of teachers, III) Students' academic self-perceptions, IV) Students' perceptions of atmosphere and V) Student's social self-perceptions (86). DREEM evaluates the learning environment of undergraduate medical education with high reliability, data can be collected according to variables such as year or institute, and it has been translated into several languages. Based on these properties, the instrument is able to generate a profile of a particular institution, enabling comparative analyses of students' perceptions of the educational environment both within and between institutions (88). Data from Hungarian setting also confirmed the applicability of the instrument, with descriptive statistics showing comparable results to international data (120).

MCPI is grounded in the concept of mutual collaboration in learning, as it was conceptualised and developed based on experiential evidence, learning theories (121) and empirical research (67, 74). Therefore, the development of the instrument is based on accumulated knowledge and experience in the field, rather than on current expert opinion

(122). Based on these properties, a large international guideline on learning in real clinical practice recommended the MCPI as the first choice for assessing workplace learning in medical education (65).

The application of the two instruments in the same setting was examined in two comparative studies, both in the British Isles. The first study was conducted by Kelly et al., which compared the two questionnaires in undergraduate entry medical student population. The performance and the similarity of the instruments showed equivalent discrimination between placements for the two questionnaires (123). The next study assessed graduate entry medical students with similar results, a strong, positive correlation was observed between the total scores of the DREEM and the MCPI. This study also compared student feedback and examined how students perceived completing the questionnaires. Based on the answers, students tended to favour the MCPI. The free-text comments indicated that the MCPI was the preferred method, as it provided an opportunity to describe the related clinical learning environment (124).

From a theoretical perspective, both questionnaires use student responses to evaluate the factors of the learning environment in undergraduate medical education. DREEM was developed to evaluate the learning environment of a program, using a standardised scoring instrument enabling comparisons between different programs (125). The MCPI, which also includes self-report items, provides rich, contextualised data based on students' experiences that can be used in a 'bottom-up' approach to examine participants' perspectives and gives the possibility to respond to them, thus enabling continuous quality improvement. On the other hand, the MCPI with fewer items provides valid information without causing 'survey fatigue' that can occur with large instruments. Overall, both instruments have a role in the evaluation of the learning environment in medical education. The MCPI provides an opportunity for direct feedback, thus not only making it possible to evaluate a particular setting, but also to act for its improvement.

5.2. Learning in real clinical practice in the early years of medical training

5.2.1. The context of early clinical experience

Medical students learn medicine by participating in real clinical practice, which is located within the triadic relationships between patients, doctors and students in authentic

workplace settings (64). In the early phase of medical training students are fascinated by clinical workplaces (126); similarly, the GP's surgery was also inspirational to them, as this immersion helped them understand what real medical practice is like. The conditions for learning were implemented on multiple levels in our sample: the timetable and the curriculum created by the department, the well-defined objectives of each practical, and the assurance of acquiring experience during every practical; these all ensured consistency in the new setting. Overall, these factors emphasise the importance of organisation in authentic clinical setting (64).

In a clinical setting, the potential for learning is created by the social interactions between the participants (33). Therefore, the learning environment and its climate are determined by the mutual relationship between learners and staff (54). This mutuality between people in the workplace is essential to create an opportunity for learning, to create a 'developmental space' for learners based on the relationships between the participants (127). In our study, the preceptor's presence provided safety during student-patient interactions and helped students to find their positions and feel comfortable in the clinical context. Safety was assured by the preceptor, who created an opportunity for students to participate as members of the community. Psychological safety is a 'team-level' phenomenon that fosters the development of interpersonal connections (128). In a psychologically safe space, all members of the collaborative group are equal, and all individual contributions are valued. This democratic arrangement is vital for collective thinking (129). Collective thinking focuses on developing every individual's perspective through learning; in an environment where emotional responses and display of distress resulting from unpredictable clinical situations are answered in a supportive way, which encourages open discussion (130).

Establishing a welcoming social environment and the kind reception of students by staff is an expression of this type of collaboration. In our case, this integration started at the beginning of the practical, when the preceptor introduced the students to the patient in a collegial manner, placing them in the community. The greeting is particularly relevant, as non-greetings and ignorance trigger defence mechanisms in students, making them reluctant to be involved in clinical work and also undermining their motivation (131). On the contrary, introducing students to staff and patients as future colleagues, engaging them

in joint problem-solving and maintaining a constant dialogue with them increases participants' sense of belonging and their dedication to participation (132).

5.2.2. Supported participation

In our setting, learning centered on conducting medical interviews, with the general aim to immerse students in the atmosphere of clinical reality. Learning in clinical environment was a new context for preclinical students, who were uncertain in these situations because they did not have the knowledge and experience necessary for patient care. In addition to acquiring new skills, the learning process was made even more complex with the active engagement of the patient (85). Therefore, the complexity of the new experience make it difficult to create meaningful explanation of the situation they act in (133). Students often struggle to understand the essence of clinical scenarios (79, 134), as was the case in our study, where students focused only on “how to bake rye bread” and not on the patients' intentions to achieve lifestyle changes. Based on the factors listed above, self-directed learning is not effective in real patient learning (RPL), and that is particularly accurate when learners are less experienced (135). Therefore, expert support is necessary for workplace learning (136, 137), which makes ‘supported participation’ the core condition for workplace learning.

Medical students must develop several qualities during workplace learning, and for that, it is particularly important for medical students to face relevant medical problems in authentic settings, so they can generate coherent hypotheses and verifications (138). Alongside the acquisition of practical knowledge, another part of the process is the development of a state of mind that includes confidence, motivation and a sense of professional identity (63). To this end, the preceptor's intellectual and social connection with the students is essential to foster active workplace learning, thus, the preceptor acts as a facilitator in RPL (139). Demonstrated in our case, in which the preceptor showed students the significance of communication skills and empathy, thereby facilitated students' interactions with patients, while continuous guidance and safety supported the overall learning process. The preceptor's support and clinical experience made learning real and linked theory and reality (140).

The contradiction of real patient learning is how students can learn by trial, but errors cannot be tolerated because they pose a threat to patient safety (5). Although preceptors

have responsibility for patient care, they should also provide opportunities for students to be involved in patient care (3). Students learn best from clinical experiences when they actively participate in clinical activities (141). Participation in clinical practice gives learners responsibility and a defined role, students are shaped by the activities, and these situations lead to personal experiences, which result in professional development (142). As a part of this process, students are challenged with tasks that allow them to step outside their comfort zone, but this only happens if the challenge is appropriate to their level of experience and is delivered in a supportive way (143). In our study, this occurred when the preceptor placed trust in students' activities, as the preceptor's active observation supported the students' attempts and only made the necessary interventions, allowing the students to find solutions to the arising problems. This created a ZPD in which participants could use their new skills in authentic context, in conditions that were safe from failure. This space between theoretical knowledge and the acquisition of actual clinical ability creates a necessary but uncomfortable tension (4, 144). The tension arising from the challenge enhances students' learning across all developmental outcomes and results in expansive learning. Therefore, supportive atmosphere and feedback from preceptors make it possible to cope with this tension (145).

5.2.3. Reflection in authentic clinical practice

Clinical situations evoke memorable events and emotions in students, and these aspects often remain unresolved during clinical activities (146). Emotions are especially relevant when medical students first encounter patients and that is largely influenced by contextual factors. An illustration of cultural norms related to emotions is what students found most concerning in ECE setting: in the UK, their presence as a threat to patients; in a Scandinavian environment, the corporeality of patients; while in our Hungarian context, humiliation by the group or the preceptor was the source of the most powerful negative emotions (53, 147). Therefore, it is important to create opportunities in ECE to deal with this developed tension.

While feedback focuses more on pedagogical aspects (148), reflection is a metacognitive process that results in greater understanding of the self and situations, which serves as a basis for future actions, while the entire process is conducted in the presence of strong emotions (149). 'Reflection-in-action' occurs when the preceptor intervenes during the

practicals to shape the ongoing activity, while ‘reflection-on-action’ is when the group discusses the entire experience together after the event (150), therefore, the process depends greatly on the supervisory style (151, 152). Based on our analysis, the preceptor’s feedback and reflection helped to correct mistakes and reinforce good practice, while discussing the students’ feelings and thoughts about their experiences helped to ease the tension developed during the student – patient interactions. Additionally, reflection helped students' progress, as they had the opportunity to see their development through the preceptor’s reflection. Similarly, discussing health status, disease characteristics, along with the focus on the person during the meetings planted the seeds of professionalism and clinical empathy. Altogether, the essence of reflection lies in personal understanding of the events, with the aim of contributing to self-improvement through the analysis of specific learning experiences (153). Since students require supervision for participation, the best way to provide reflective guidance is a supportive professional relationship (154, 155).

5.2.4. Humane approach in real patient learning

Medical students’ behaviour is influenced by continuous subconscious processing of how experienced clinicians express their emotional responses (156). The cultural norms of medicine promote emotional detachment and clinical neutrality in doctor-patient interactions (20), in which doctors provide reliable care to all patients regardless of their personal feelings (156-158).

However, patient encounters evoke a variety of emotions depending on patients’ life situations (159). Clinical empathy is a multi-component phenomenon (160) that involves not just affective but also cognitive and motivational components. It is considered an emotional attunement that directs attention to the patient and helps to formulate appropriate responses to the clinical situation, while moving the focus of attention from mere witness to curiosity about the other person’s perspective and perception (130, 158). Preceptorial support enabled medical students during the practicals to understand that asking questions about illness is something other than just talking to people based on a checklist. When the preceptor dedicated time to support students’ participation, provided reflection, and enriched the clinical experience with humane aspects; this approach enabled students to deepen their understanding of medical practice and to see patients as

persons. This supportive approach helps students become aware that patients are fellow human beings with experiences and values (76). Meaningful experiences and reflection by credible preceptors are needed to understand the value of listening and empathy, and to support the development of person-centredness (161).

Alongside with patient-student interactions, the preceptors' attitude and the way they interact with students is an essential factor that affects learning (66). The formation of emotions is also influenced by socio-cultural discourses (162). Therefore, when the preceptor provided a kind and supportive oversight, it was reassuring for the students. On the contrary, without guidance, students experienced dissonance in their understandings of their role in medicine, as illustrated by their mimicked professionalism with which they tried to position themselves as doctors. Thus, based on the authentic experiences and the related emotions, students constantly position themselves within real patient learning (163).

5.2.5. Professional identity formation

The becoming of a physician is the transformation of a lay person into a medical professional, in which learning and emotions are both integral parts of professional identity formation (PIF). PIF is an active, developmental process which is dynamic and constructed individually and socially (164). Professional identity is contested and accepted through a continuous, synergistic process of internal and external identification (165). First, PIF must be congruent with the processes through which people develop a personal identity, so the reshaping of personal identity is part of this process (e.g. internal values). Second, external factors (e.g. peers, preceptors) also have great influence, and as a result of mutual social interactions and the acquisition of new experiences, the individual moves from legitimate peripheral participation to full participation in the community of practice (166). Thus, students constantly reconstruct their identities by positioning themselves in interactions with others in the world of medicine (167-169).

Role conflicts arose when students began their professional transformation during the practicals – for example, when they noted that they were closer to the patients' grandchildren than to the doctor from patients' perspective. In line with their evolving understanding of their place in medicine, they also observed different models of behaviour from their preceptors, which likewise influenced the development of their

professional identity. Participation gives examples of role models, as physicians embody different types of roles during the practicals (150). Similarly, preceptors' activities reflect the reconciliation of their individual clinician and teacher identities (170, 171), as illustrated by listing unknown medications prescribed for diseases that the students were also unfamiliar with. When students meet with preceptors who demonstrate the value of empathy, a person-centred attitude and competence in patient care, the associated cognitive and behavioural processes are fundamental in the professional identity formation of students (172, 173).

To promote this professional development, preceptors provide collegial oversight to kindle the potential for intersubjective bonds between individuals in the practicals (157) and to support the understanding of professionalism (71). Clinical leadership is the utmost expression of the clinician and teacher identity, which evolves subtly through experience in clinical practice (154). Leadership refers to a complex intellectual virtue that represents the ability to appropriately understand the unique details that occur in human connections and to act accordingly (174). In our data, this occurred when the preceptor guided the students with the appropriate practical application of clinical knowledge and ensured the values of the patient-doctor relationship through empathic understanding of both the students and the patient. This is an example of why preceptors, given their position, should advocate for 'humanistic medicine': if students see that they are approached with support and humanity, they will treat patients in the same person-centred way (175-177). Therefore, mentorship, guidance from educators are pivotal to ensure that students are not left to their own devices as they attempt to reconcile competing discourses (178).

5.2.6. Longitudinal trajectories

Medical education is a longitudinal process whereby students go through several transitional stages as they progress from novices to experts. The transition from the preclinical environment to the clerkship phase is only one movement of this training continuum, and these changes are all dynamic actions with different challenges (85). Similarly, acquiring expertise in medicine is a long process, during which the continuous support and guidance of mentors provides the basis for learners' progressive autonomy, thereby enabling safe development (179). Mutual trust therefore has a prominent role in the entire process, with a focus on the transfer of high quality care (180). Therefore,

longitudinal relationships, such as mentoring programs (181, 182) continue to have an important role in the process of becoming a physician. Overall, real patient learning - within the triad of students, preceptors and patients – should continue to be the foundation of modern medical practice, as human connections remain at the center of medicine (183).

5.2.7. Limitations

The majority of our data comes from the population of first- and second-year students, which does not allow us to extrapolate our results to the entire undergraduate medical training programme. The response rate was around 50%, which means that the responses may not reflect the views of all students. As our results originate from only one center, the conclusions may not be applicable to other settings where longitudinal professional supervision is not provided in the preclinical years. Likewise, the adaptation of multiple interpretations that can be derived from subtle differences in the environment may also be related to contextual bias. Similarly, our analysis used only student responses; so, we know only indirectly about the perspectives of preceptors or patients.

6. Conclusions

Our project had two purposes, first, to evaluate the psychometric properties of the MCPI in a Hungarian context, and second, to examine whether the MCPI can be used to assess the components of workplace learning in the preclinical years.

In our first study, we demonstrated that the factorial structure of the Hungarian version of the MCPI was best explained by the bifactor model; however, our subsequent analysis showed that instead of the two previously suggested subscales, the use of a strong general factor with the entire score was supported. Based on this, the Hungarian version of the MCPI is best conceptualised as a unidimensional instrument. The ease of its application and the option for additional textual answers makes it possible to use this instrument for curriculum development purposes as well, providing direct feedback to preceptors on the needs of medical students. The textual responses also allow for the exploration of cultural differences among students, providing valuable insight into factors contributing to good practice in medical education.

Our second study showed a unique description of an ECE-based qualitative data, and the value of the MCPI as a valid instrument for assessing workplace learning in preclinical years. Free-text answers helped to identify that the preceptor's collegial, welcoming attitude created a psychologically safe space that facilitated students' active participation in the workplaces. In these situations, the preceptor's observation and personal feedback, as well as real-life examples derived from patient care, enabled students to interpret what had been experienced in the clinical context. Reflection on students' emotional responses and the patients' perspectives provided the background for the development of clinical empathy, while the preceptor's engagement and enthusiasm served as a role model for the students' identity development.

Overall, the supportive atmosphere and the relationships in the workplace enable active student involvement. These constituents make it possible for learners to begin to explore the intellectual and affective details of medical practice and lay the foundation for their future practice. Therefore, the student – preceptor relationships are highly influential in the ECE setting.

The main findings of our project:

1. The MCPI was proved to be applicable in the Hungarian context.
2. The Hungarian version of the MCPI is best conceptualised as a unidimensional instrument with a general factor.
3. The free-text answers of the MCPI enable the assessment of medical students' needs regarding workplace learning in early clinical experience.
4. In early clinical experience contextual factors are highly influential, supportive preceptorial observation and feedback enable workplace learning, and tension arise both for students and preceptors in these relationships.
5. The numerical and textual responses of the MCPI enable the faculty to provide direct feedback to the preceptors from students' perspective with the instrument, which creates an opportunity to enhance the quality of workplace learning.

7. Summary

Students learn medicine in authentic workplaces, so instruments were developed to assess the impact of the learning environment. The Manchester Clinical Placement Index (MCPI) is an eight-item, mixed-methods instrument developed to evaluate medical students' real-patient learning. Although it is widely used in English-language context, there was limited evidence of its applicability to other languages; therefore, one aim of the present work was to examine the factor structure and key psychometric properties of the Hungarian version of the MCPI. In parallel, recognising that real life experiences are central to the development of medical students' identity, the second objective was to explore the constituents of real patient learning in the preclinical years of medical students.

As part of this work, the MCPI was used to collect cross-sectional data among medical students in both preclinical and clinical years, after which factor analysis was performed. In a parallel cross-sectional study, the MCPI was used to assess the influence of the learning environment in the preclinical years of medical students, followed by an examination of the students' free-text responses using latent construct analysis.

The results of the psychometric analysis indicated that although a bifactor model demonstrated the best overall model fit, but the strong reliability of the general factor supported the interpretation of the Hungarian version of the MCPI as a unidimensional instrument, while the distinct application of the subscales was not statistically supported due to their low reliabilities. This observation can be explained by socio-cultural differences between the original and present contexts, whereas the evaluation itself provides an important foundation for continuous quality improvement.

The qualitative analysis of early clinical experience revealed three central themes: the influence of contextual factors in facilitating active student involvement; the importance of observation and personalised feedback as core elements of learning; and sources of tension for both students and preceptors. The factors listed above supported the formation of knowledge in an authentic clinical context, while the professional empathy of the preceptors set an example to follow, thereby supporting a humane, person-centred approach to care and the development of professional identity. Overall, our findings stress the importance of the welcoming atmosphere and preceptorial support.

8. Supplements

8.1. Supplement 1. - Manchester Clinical Placement Index (MCPI) (87)

Leadership
There is leadership if one or more senior doctors (consultant, GP, registrar) take responsibility for your education
Please rate your agreement (0 = strongly disagree; 3 = neither agree nor disagree; 6 = strongly agree) with this statement: There was leadership of this placement ____
Please add comments to either or both of the next two boxes: Strengths of leadership were ... (Free text box) Weaknesses or ways leadership could be improved ... (Free text box)

Reception / induction
An appropriate reception is a welcome that includes an explanation of how the placement can contribute to your real patient learning
Please rate your agreement (0 = strongly disagree; 3 = neither agree nor disagree; 6 = strongly agree) with this statement: There was an appropriate reception to this placement ____
Please add comments to either or both of the next two boxes: Strengths of the reception were... (Free text box) Weaknesses or ways the reception could be improved ... (Free text box)

People
The support to your real patient learning from people (like doctors, secretaries, receptionists, nurses, and others) you met on the placement
Please rate your agreement (0 = strongly disagree; 3 = neither agree nor disagree; 6 = strongly agree) with this statement: I was supported by the people I met on this placement ____
Please add comments to either or both of the next two boxes: Strengths of any or all of the groups of people listed above were ... (Free text box) Weaknesses of any of the groups of people listed above or ways they could contribute more ... (Free text box)

Instruction
Clinical teaching may include instruction in how to perform clinical skills (like history taking, examination, practical procedures etc.) on real patients
Please rate your agreement (0 = strongly disagree; 3 = neither agree nor disagree; 6 = strongly agree) with this statement: I was instructed in how to perform clinical skills on real patients ____
Please add comments to either or both of the next two boxes: Strengths of instruction were ... (Free text box) Weaknesses or ways instruction could be improved ... (Free text box)

Observation
Clinical teaching may include teachers observing you perform clinical tasks on real patients
Please rate your agreement (0 = strongly disagree; 3 = neither agree nor disagree; 6 = strongly agree) with this statement: I was observed performing clinical tasks on real patients ____

Observation
Please add comments to either or both of the next two boxes: Strengths of observation were ... (Free text box) Weaknesses or ways observation could be improved ... (Free text box)

Feedback
Clinical teaching may include teachers giving you feedback on how you performed clinical tasks on real patients
Please rate your agreement (0 = strongly disagree; 3 = neither agree nor disagree; 6 = strongly agree) with this statement: I received feedback on how I performed clinical tasks on real patients ____
Please add comments to either or both of the next two boxes: Strengths of feedback were... (Free text box) Weaknesses or ways feedback could be improved ... (Free text box)

Facilities
Your learning environment may include such things as space for students (to write notes, read, and be taught) and resources (books, computers or other materials) that support your real patient learning
Please rate your agreement (0 = strongly disagree; 3 = neither agree nor disagree; 6 = strongly agree) with this statement: This placement provided appropriate facilities ____
Please add comments to either or both of the next two boxes: Strengths of the facilities were ... (Free text box) Weaknesses or ways the facilities could be improved ... (Free text box)

Organisation of the placement
An appropriately organised placement is one whose teaching and learning activities are organised in a way that supports your real patient learning
Please rate your agreement (0 = strongly disagree; 3 = neither agree nor disagree; 6 = strongly agree) with this statement: This placement was appropriately organised ____
Please add comments to either or both of the next two boxes: Strengths of organisation were... (Free text box) Weaknesses or ways organisation could be improved ... (Free text box)

8.2. Supplement 2. - Quotations

2019/10	<i>"There were clinical encounters in which we, as students, were unable to speak or we could not ask the patient any questions, because their train of thought could not be interrupted even once for us to ask questions..."</i>
2019/22	<i>"He invited the patient to express her opinion on their needs from a doctor. This was a useful experience for me."</i>
2019/47	<i>"There was very little space, it was almost impossible to take notes."</i>
2019/68	<i>"Everything was well-organised, the practicals started and ended on time."</i>
2019/68/2	<i>"Everything was explained, so we knew exactly what to do, and then there was a chance to practice."</i>
2019/92	<i>"She (the preceptor) gave us her full attention; she didn't dedicate her focus to anything else."</i>
2019/125	<i>"It helped us in interviewing patients, that before the patient arrived, we discussed what to ask and how to guide the conversation..."</i>
2019/130	<i>"The doctor kindly highlighted what we did well and what could be improved. She explained the reasons behind any mistakes, showed us again how to do it correctly if it was necessary and helped us to improve."</i>
2019/136	<i>"When the anamnesis was taken in a group session, the patient just started speaking or the preceptor asked the questions, so the students were less involved in the process..."</i>
2019/138	<i>"We clarified beforehand what the individual sessions and the structure of the whole semester would look like, what to expect and what would be expected of us."</i>

2019/165	<i>"Because the preceptor was not present when we had to talk to the patients. When it was difficult to control the conversation, we could have used his help. Many times, we didn't even know if what we were asking was right."</i>
2019/174/2	<i>"...I really enjoyed that we had to find out the patient's medical history ourselves at the beginning and afterwards we always talked the patient's case over together and then we discussed our feelings and experiences."</i>
2019/188	<i>"At the beginning she told me what to do, then she gradually gave me the field, and in the last session she just observed me and assessed my work at the end."</i>
2021/9	<i>"All the necessary equipment was available. ECG, reflex hammer etc. On the first day I forgot to bring a stethoscope, and they were able to provide one."</i>
2021/42	<i>"I was given a white coat, they were kind, they looked after me, they trained me."</i>
2021/70	<i>"(They) allowed me to get involved in patient care (measuring blood pressure, doing a venepuncture, interviewing, taking a medical history)."</i>
2021/81	<i>"There was no awkwardness, the doctor told all the patients who I was and why I was there, so the patients weren't stressed out, and neither was I. I was welcomed in the office as a student in a very kind and helpful way..."</i>
2021/81/2	<i>"I felt trust from my teacher, yet he observed my work and gave me good advice when needed. It was very important that he said all this with complete goodwill and did not humiliate me while explaining. If my clumsiness did not affect the examination, he did not help with advice in front of the patient, but after the patient had left. Also, it was important that he proactively supported my communication with the patient."</i>

2021/100	<i>"The doctor hosted us in her own workplace, which gave us an insight into the day-to-day running of a GP surgery and allowed us to talk to patients in a familiar environment."</i>
2021/105	<i>"We were able to meet nice staff in a calm environment, and the patients were also very open and communicative in their familiar surroundings, they seemed to have trust in us as well."</i>
2021/149	<i>"When interviewing the patient, she followed up our work, made suggestions, gave advice on how to be more successful."</i>
2021/153	<i>"To involve ourselves in the examination of and communication with the patient. This would have required, first of all, knowing what to do with, for example, a stethoscope, which we had never had in our hands, and we had never been taught how to auscultate or what to hear, so obviously no one could examine a patient. The same goes for interviewing the patient, without the know-how, if we don't even get helpful questions to ask, we can't do the anamnesis taking."</i>
2022/9	<i>"Sometimes the feedback was a bit offensive, and for me, it was also uncomfortable that everyone got feedback in front of the whole group."</i>
2022/23	<i>"I knew exactly what to do and how to do it, the patient didn't even notice that I was not a professional."</i>
2022/33	<i>(the instructions could be improved) "by giving specific advice on how to approach the patient in this artificial situation, how to talk in general, what questions to ask, whether to interrupt if the patient talks at length, etc."</i>
2022/55	<i>"Afterwards, we received detailed feedback on whether our questions to the patients were good and in which direction the conversation could have been led further or what could have been reflected on."</i>

2022/68	<i>"She had a wealth of experience, was helpful, answered all our questions willingly. You could see she had a wealth of knowledge; it was a pleasure to learn from her. She often gave us wise ideas that we can use not only in our future medical careers, but also in our daily lives."</i>
2022/78	<i>"In the first lesson we talked about why we were there, what we wanted to achieve with this project and how we were going to do it. In fact, before each patient we got a little guidance from the doctor on what we should try to focus on, but she never shot the "punch line" of what the disease was or the purpose of the meeting, we had to find that out on our own through communication and questioning."</i>
2022/118/2	<i>"Space was limited, we had to sit in a corner or write on our laps. Obviously not that comfortable, but we're used to it in other practicals, so we didn't make a big deal of it, it was acceptable. We didn't need anything other than the place."</i>
2022/124	<i>"We went after the appointments, so we didn't have to interview the patient in the middle of acute care, but in a relaxed environment."</i>
2022/175	<i>(The instructions) "They were clear, precise, but at the same time not dumbed down, the Doctor didn't explain the tasks as if we were stupid, but as if we could actually do them successfully. On the one hand, this gave us confidence, and on the other hand, the patient was not nervous that we were learning on her, because she was confident that we could do it."</i>
2022/204	<i>"At the beginning of the semester specifically, then less so, but there were still occasions when the teacher scolded us harshly, almost insultingly, and told us how we had interviewed the patient very badly (especially the very first time) and because of that we felt that she had not taken into account that we had never done that before..."</i>

2022/208	<i>"The practical was well structured, there was enough time to get to know the patients in detail, ask questions and then the group could analyse the situation on their own."</i>
2023/18	<i>"The teacher did not stop the patient in detailing private information that was not relevant at all, did not teach us how to handle such a case."</i>
2023/22	<i>"She could have helped us by not taking over the task from us but letting us develop."</i>
2023/31	<i>"According to the patients' descriptions, the doctor examines her patients in extraordinary detail, has enormous knowledge and makes accurate diagnoses, ... The doctor had thus become a role model, even more so by sharing the little tricks she has revealed to help us becoming GOOD doctors..."</i>
2023/34	<i>"We had a patient come to the class who told us about herself and her illness, how she had experienced it in her life, and it was a huge experience to get an insight into the emotions she was going through when she found out about her illness and how her family took the news..."</i>
2023/42	<i>"Our practicals were in an office building... I don't believe that an office building is the best place to get an insight into a real doctor-patient encounter."</i>
2023/43	<i>"I had the chance to learn a lot about myself. And when an evaluation was given, afterwards everyone tried to incorporate it into the task of questioning the next time, everyone wanted to improve the way we take anamnesis."</i>
2023/66	<i>"It showed us that it is always the patient who should be in the spotlight, as a person, not the disease. She (the preceptor) stressed the importance of empathy, good communication and coordination skills."</i>
2024/18	<i>"Because it was informal, personal and exciting. It was easy to listen and enjoyable to learn in such an environment, not stressful."</i>

2024/48	<i>"During the first doctor-patient encounter of our lives, it was a great comfort to have our preceptor at our side when taking the anamnesis, who steered the conversation in the right direction if it was necessary..."</i>
2024/56	<i>"After the task, we drew conclusions together as a group, first we ourselves said how we felt about the performance of the task, then the preceptor, based on the notes he had written down during the practical, and then we got more ideas and explanations on how to do this task better another time."</i>
2024/60	<i>"They tried to explain and convey everything clearly. We ourselves were able to interview patients, learn how to take a medical history and do simple practical tasks such as measuring blood pressure, taking blood samples, etc."</i>

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10. Bibliography of the candidate's publications

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