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THE EMOTIONAL INTELLIGENCE OF SOCIAL CARE AND HEALTHCARE APPLICANTS

Development and evaluation of the test for student selection

Anne Pienimaa

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The originality of this publication has been checked in accordance with the University of Turku quality assurance system using the Turnitin OriginalityCheck service.

ISBN 978-951-29-9438-0 (PRINT)
ISBN 978-951-29-9439-7 (PDF)
ISSN 0355-9483 (Print)
ISSN 2343-3213 (Online)
Painosalama, Turku, Finland 2023

Dedicated to my father Esko Olavi Mäkinen 2.4.1950–5.3.2020.,
who always believed in me and my abilities.

UNIVERSITY OF TURKU
Faculty of Medicine
Department of Nursing Science
Nursing Science
ANNE PIENIMAA: The Emotional Intelligence of Social Care and Healthcare Applicants – Development and Evaluation of the Test for Student Selection
Doctoral Dissertation, 138 pp.
Doctoral Programme in Nursing Science
October 2023

ABSTRACT

Emotional intelligence (EI) is a set of abilities including the perception, expression and management of emotions. Social care and healthcare students engage in clinical practice in their studies and clinical environments can be emotionally challenging. EI is reported to reduce stress, enhance overall study success and performance in clinical practice. However, the research on social care and healthcare student selection is scarce, thus more research is needed. The purpose of this study was to develop and evaluate an emotional intelligence test (EMI-T) for the social care and healthcare student selection in UASs and assess applicants' EI and factors related to it. The goal was to enhance social care and healthcare student selection. This three-phased study included theoretical phase, test development phase and evaluation phase. The data collection methods in theoretical phase were systematic literature search (n=26), focus group interviews (n=5) and structured questionnaire for social care and healthcare educators and professionals. In development phase the data were collected with structured questionnaire for three expert panels and EMI-T in pilot studies for first-year social care and healthcare students (first pilot n=346; second pilot n=205). In evaluation phase the data were collected with EMI-T from applicants participating in student selection in Spring 2021 (n=4808). The analysis methods were content analysis, calculation of I-CVI, Item Response Theory (IRT) using graphical analysis with TestGardener software, descriptive measurements, correlations, ANOVA, Tuckey's test in post-hoc multiple group comparisons and linear regression analysis. According to the results the developed EMI-T proved to be easy but a comprehensive and objective test to assess applicants' EI. The applicants' EI was above the centre of the score range and they performed better in management of emotions than other EI abilities. Female gender, older age, higher previous education, parents' current employment status and if applicant or his/her parents were born in Finland indicated better EI, but these factors explained minorly applicants' EI variation indicating that fair student selection is possible using the EMI-T. The results can be used for further development of the EMI-T and development of social care and healthcare student selection and education.

KEYWORDS: emotional intelligence, focus group interview, item response theory, psychometric evaluation, social care and healthcare applicant, student selection, systematic literature review, test development

TURUN YLIOPISTO
Lääketieteellinen tiedekunta
Hoitotieteen laitos
Hoitotiede
ANNE PIENIMAA: Sosiaali- ja terveysalan hakijoiden tunneäly –
Opiskelijavalintaan tarkoitetun testin kehittäminen ja arviointi
Väitöskirja, 138 s.
Hoitotieteen tohtoriohjelma
Lokakuu 2023

TIIVISTELMÄ

Tunneäly muodostuu erilaisista taidoista, kuten kyvystä arvioida, ilmaista ja säädellä tunteita. Sosiaali- ja terveysalan (sote-alan) opiskelu sisältää käytännön harjoittelua ja harjoitteluympäristöt voivat olla emotionaalisesti kuormittavia. Tunneälyn on osoitettu vähentävän stressiä, parantavan opiskelijoiden opintomenestystä ja suoriutumista käytännön harjoittelussa. Tällä hetkellä on vähän tutkimusta siitä, miten valita opiskelijoita sote-alan koulutukseen, joten tutkimusta tarvitaan lisää. Tämän tutkimuksen tarkoituksena oli kehittää tunneälytesti (EMI-T) ammattikorkeakoulujen sote-alan koulutuksen opiskelijavalintaan ja arvioida koulutukseen hakevien tunneälyä. Tavoitteena oli kehittää sote-alan opiskelijavalintaa. Tutkimus koostui 3 vaiheesta: teoreettinen vaihe, kehittämisvaihe ja arviointivaihe. Teoreettisessa vaiheessa aineistonkeruumenetelmät olivat systemaattinen kirjallisuuskatsaus (n=26), fokusryhmähaastattelut (n=5) ja sturkturoitu kyselylomake sote-alan opettajille ja ammattilaisille. Kehittämisvaiheessa aineisto kerättiin kolmelta asiantuntijapaneelilta strukturoidulla kyselylomakkeella ja pilottitutkimuksissa EMI-T:llä ensimmäisen vuoden sote-alan opiskelijoilta (pilotti 1 n=346, pilotti 2 n=205). Arviointivaiheessa aineisto kerättiin EMI-T:llä kevään 2021 sote-alan valintakokeen hakijoilta (n=4808). Tutkimuksen analyysimenetelminä käytettiin sisällön analyysiä, tehtäväkohtaista luotettavuusindeksiä, osiovasteanalyysiä käyttäen TestGardener ohjelmaa, kuvailevia menetelmiä, varianssianalyysiä, Tukey:n testiä ja lineaarista regressioanalyysiä. Tutkimuksessa kehitetty EMI-T osoittautui helpoksi, mutta objektiiviseksi ja kattavaksi testiksi arvioida sote-alan hakijoita. Hakijat menestyivät tunneälytestissä hyvin, mutta suoriutuivat tunteiden hallinnan osiossa parhaiten. Parempaa tunneälyä selittivät naissukupuoli, korkeampi ikä, aiempi koulutus ja vanhempien työssäolo sekä Suomi hakijan ja tämän vanhempien synnyinpaikkana. Nämä tekijät selittivät hakijoiden tunneälyä kuitenkin vain vähän, joten EMI-T:n käyttö opiskelijavalinnassa näyttäisi mahdollistavan oikeudenmukaisen valinnan. Tuloksia voidaan hyödyntää EMI-T:n jatkokehittämisessä sekä sote-alan opiskelijavalintojen ja koulutuksen kehittämisessä.

AVAINSANAT: tunneäly, fokusryhmähaastattelu, osiovasteanalyysi, psykometrinen arviointi, sosiaali- ja terveysalan hakija, opiskelijavalinta, systemaattinen kirjallisuuskatsaus, testin kehittäminen

Table of Contents

Abbreviations

ANOVA	Analysis of variance
CTT	Classical Test Theory
EI	Emotional intelligence
EMI-T	Emotional Intelligence Test
EU	European Union
GANES	Global Alliance for Leadership in Nursing Education and Science
GPA	Grade Point Average
HEI	Higher education institution
ICC	Item Characteristic Curve
I-CVI	Item Content Validity Index
IRT	Item Response Theory
ReSSNE	Reforming Student Selection in Nursing Education
UAS	Universities of Applied Sciences
UAS Exam	National joint digital entrance examination
USA	United States of America

List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

I Pienimaa, A., Haavisto, E. & Talman, K. Emotional Intelligence Instruments Used in Health Care Education. *Journal of Nursing Education*, 2022; 61(1): 6–11.

II Pienimaa A., Talman, K. & Haavisto, E. The assessment of emotional intelligence in social care and healthcare student selection: A qualitative descriptive study. *Educational Research*, 2021; 63(3): 302–318.

III Pienimaa A., Talman, K., Vierula, J., Laakkonen, E. & Haavisto, E. Development and psychometric evaluation of the Emotional Intelligence Test (EMI-T) for social care and healthcare student selection. *Journal of Advanced Nursing*, 2022; 00: pages 1–14.

IV Pienimaa, A., Haavisto, E., Hupli, M., Vierula, J., Koistinen, A. & Talman, K. Undergraduate social care and healthcare applicants' emotional intelligence and factors related to it: a cross sectional study. *Manuscript*

1 Introduction

Social care and healthcare student selection is a process which can have serious consequences for applicants, higher education institutions and societies that requires skilled social care and healthcare professionals to be able to provide safe and efficient service and care for citizens. The student selection affects numerous institutes of higher education and thousands of applicants yearly. Alone in United States of America (USA), 256,578 applicants enrolled to entry-level baccalaureate nursing programs in the academic year of 2022 (American Association of Colleges of Nursing, 2022). According to Finnish National Agency for Education Statistics (Vipunen, 2022) over 55,000 people applied of which about 15,000 received a place to study bachelor's degree in social and healthcare in Universities of Applied Sciences (UASs) in 2022. Selection decisions should be based on objective and valid methods reflecting the requirements of the professional education and professional demands. However, there is an insufficient amount of evidence regarding social care and healthcare student selection practices. (Haavisto et al., 2019; Rankin, 2013; Talman et al., 2020.)

Social care and healthcare professions and education share similar values and contents. The core of the work is in the interactions with other human beings and the aim is to help others. This work requires using one's own personality as an instrument. The requirements such as ethical conscience, interaction-, and communicational abilities, respecting human rights, doing no harm, social justice and respect for diversity are common for all social care and healthcare professionals although the professional knowledge that social care and healthcare professions require are partly different. The general competencies such as decision making, problem solving, assessment, planning, implementation, and evaluation of patient's care or client's services are part of all social care and healthcare professionals' work. (American Nurses Association, 2021; Health and Care Professions Council, 2022; International Council of Nurses, 2022a, 2022b; International Federation of Social Workers, 2022.)

Emotional intelligence (EI) has also been registered as important ability for social care and healthcare professionals. According to Morrison (2007), for example, perception of emotions is essential in professionals such as social care and healthcare

providers to make adequate observations and assessments. EI can be defined as multitude of abilities such as the verbal and non-verbal perception and expression of emotions, management of emotions in the self and others as well as the ability to use own or others' emotions to achieve goals and solve problems (Law et al., 2004; Mayer et al., 2008; Salovey and Mayer, 1990). The EI is reported to have positive relation to healthcare students' overall academic performance and especially clinical performance (Lewis et al., 2017; Rankin, 2013; Sharon and Grinberg, 2018). The research of EI during the social science studies or student selection is scarce. Thus, studies researching undergraduate social care students' or applicants' EI and its' relation to study success do not seem to exist. Previous studies suggest that EI may be essential for coping emotionally challenging environments in clinical placements (Grant et al., 2014; Lewis et al., 2017; Michelangelo, 2015). This is important because social care and healthcare students encounter emotionally challenging environments during clinical placements. Emotional exhaustion, high emotional demands, and work-related stress are known issues in social care and healthcare work, and these factors seem to contribute to the intent to leave the profession (Kim and Stoner, 2008; Laschinger, 2012). However, EI seems to buffer healthcare professionals stress and help their coping (Hong and Lee, 2016; Karimi et al., 2015).

Thus, it is important for higher education institutions to select students with sufficient EI so that they can succeed in their studies, graduate on time and cope with the emotionally challenging situations in the workplaces (Chew et al., 2013; Lewis et al., 2017; Partido and Stafford, 2018; Rankin, 2013; Snowden et al., 2018). Graduating social care and healthcare students that also succeed in their profession are needed by society to achieve a sufficient workforce. Currently this is extremely important because there is a shortage of skilled health professionals. It is estimated that there will be a global deficit of over seven million nurses and midwives by 2030. (World Health Organization, 2021.) In the member states of European Union (EU), nurses and other health professionals were among the occupations with the most critical shortages in 2020 (Eurofound, 2021; European Commission, 2020). In Finland, registered nurses, public health nurses and specialised social workers make up top three professions with biggest shortage (Ministry of Economic Affairs and Employment of Finland, 2021). It is estimated that this shortage will continue as approximately 50% of healthcare and social care workforce will retire by 2035 (Hanhijoki, 2020; Koponen, 2015).

This study focuses on the assessment of emotional intelligence in undergraduate social care and healthcare student selection. It was conducted in co-operation with two projects: Reforming Student Selection in Nursing Education (ReSSNE) and Development Project for Student Selection in Finnish Universities of Applied Sciences. In ReSSNE, the evidence-based content and structure for a new nationwide electronic nursing entrance examination was developed in 2015-2021 (Haavisto et

al., 2019). The Development Project for Student Selection in Finnish Universities of Applied Sciences, aimed to produce a competence-based, cost efficient, applicant-friendly, and digitally advanced selection methods for social care and healthcare student selection in 2017-2019 (Talman et al., 2018a). This dissertation study provided a new selection test for social care and healthcare student selection and provided new knowledge about social care and healthcare applicants' EI and its' relation to study success and different demographic factors.

The purpose of this three-phased doctoral dissertation was to 1) identify a relevant content of emotional intelligence to be assessed in undergraduate social care and healthcare student selection, 2) develop and psychometrically evaluate an emotional intelligence test (EMI-T) for the undergraduate social care and healthcare student selection in UASs and 3) to assess undergraduate social care and healthcare applicants' EI and factors related to it. The goal was to enhance undergraduate social care and healthcare student selection to be objective and more comprehensive and thus, equal. The ultimate goal was to enable the selection of applicants with sufficient EI to be able to interact adequately with the patients and their closed ones early on during the clinical placements and, thus improve the quality of care.

2 Review of the Literature

2.1 Social care and healthcare education and student selection

2.1.1 Social care and healthcare education

The social care and healthcare education is regulated with different global or national guidelines and regulations. The guidelines and regulations provide standards for several social care and healthcare education aspects such as student selection, clinical practises, curriculum, learning outcomes, and requirements of the academic staff. (e.g., EU directive 2005/36/EC; Global Alliance for Leadership in Nursing Education and Science [GANES], 2019; International Association of Schools of Social Work and International Federation of Social Workers, 2020.)

The educational pathways, levels and duration differ internationally. In the USA, for example, in nursing education bachelor's degrees are offered by colleges and universities, the associate degrees by community and junior colleges and diploma programs offered by hospitals. Typically, the duration of nursing program in bachelor level is three to four years. (U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis, 2020.) There is three level social work education (bachelor's degree, master's degree and doctoral degree) in USA and a bachelor level education in social work takes typically four years to complete (International Association of Schools of Social Work and International Federation of Social Workers, 2020; National Association of Social Workers, 2022). In Europe, the aim has been to establish a coherent three-level higher education where the basic education consists of bachelor level degree (Cabrera and Zabalegui, 2021). However, there are still countries in Europe offering diploma level social care and healthcare education. The usual duration of bachelor level degree education is three to five years in Europe. (Hamilton Lyons, 2019; Praxmarer-Fernandes et al., 2017.) In Finland, the education in social care and healthcare is provided in higher education institutions. The length of social care and healthcare bachelor's degrees in Universities of Applied Sciences (Table 1.) varies from 210 to 270 ECTS credits and the expected time of graduation

is from 3,5 years to 4,5 years depending on the programme (Ministry of Education and Culture, 2022a; 2022b).

Table 1. Undergraduate (Bachelor degrees) social care and healthcare degree programmes in Finland.

Study field	Undergraduate degrees
Healthcare	Registered Nurse, Public Health Nurse, Midwife, Paramedics, Physiotherapist, Occupational Therapist, Radiographer, Physical Education Instructor, Podiatrist, Optometrist, Naprapath, Osteopath, Biomedical Laboratory Scientists, Dental Hygienist, Prosthetics and Orthotics*
Social care	Bachelor of Social Services, Geronomy, Rehabilitation Counsellor

*reference: www.ammattikorkeakouluun.fi/koulutukset/

Although, the social care and healthcare education varies globally for example in terms of its structures and delivery methods (Patterson et al., 2018) the core components of the education include similar contents and requirements. Furthermore, the core of the work in social care and healthcare is in the interactions with other human beings and the aim is to help others. The core purpose of social care and healthcare education is the development of professional competence that enables graduating students to recognise and use evidence-based knowledge, possess adequate clinical reasoning, judgement skills and person-centred ethical values and relation skills to make accurate assessments, effective interventions, and collaborate, counsel, lead and interact with others in an acceptable way. (Al Jabri et al., 2021; Eriksson et al., 2015; GANES, 2019; Stanley and Mettilda, 2021.) The social care and healthcare education should aim to provide abilities to all the professional requirements that are required to give quality care and help to patients and/or clients. The social care and healthcare education also includes clinical practise where students need to show that they can implement theoretical studies to the practise (EU Directive 2005/36/EC; GANES, 2019; International Association of Schools of Social Work and International Federation of Social Workers, 2020). In Finland, all social care and healthcare education includes contents such as ethics, client/patient orientation, implementation of theoretical studies to the practise, and communication and interaction abilities. Furthermore, the education includes practical training. (UASinfo.fi, 2022.)

2.1.2 Social care and healthcare student selection

Social care and healthcare student selection processes vary between countries and educational institutions. In most of the countries, institutions of higher education regulate their student selection methods and processes independently and student

selection processes are based on national laws and regulations (e.g., Directorate of Evaluation, Forecasting and Performance monitoring, 2020; McGinley, 2020; OECD, 2021; Patterson et al., 2018).

The student selection research is scarce in social care and healthcare programmes (Arora et al., 2010; Morrison et al., 2007) concentrating mainly in nursing and medical programmes (e.g., Leinster, 2013; Shulruf et al., 2018; Talman et al., 2018b; Taylor et al., 2014). Usually, institutions of higher education use several selection methods when selecting student to the social care and healthcare programs. (Capponi and Mason Barber, 2020; Leinster, 2013; Sladek et al., 2019). Globally mostly used selection methods in undergraduate social care and healthcare are 1) previous academic achievement or prerequisite courses (Grade Point Average, GPA), 2) standardised tests (e.g., University Clinical Aptitude Test, Undergraduate Medicine and Health Sciences Admission test, Health Education Systems Inc. exam), 3) professional references, 4) written essays and 5) interviews. These methods either assess the student's academic knowledge or aptitude. (Capponi and Mason Barber, 2020; Coyle et al., 2011; Huber et al., 2022; Leinster, 2013; Patterson et al., 2016; Shulruf et al., 2018; Talman et al., 2018a.) The most used selection method is the previous academic achievement using grade point averages (GPA) from pre-required courses or high school diplomas and equivalent certifications (Coyle et al., 2011; Patterson et al., 2016; Talman 2014). Previous research has established that it predicts study success (Capponi and Mason Barber, 2020; McManus et al., 2013).

Standardised tests (e.g., University Clinical Aptitude Test [UCAT], Undergraduate Medicine [UMAT] and Health Sciences Admission test, Health Education Systems Inc. [HESI] exam) assess social and healthcare applicants' academical knowledge and aptitude. The tests include several sections assessing cognitive skills such as mathematics, reading comprehension, vocabulary and general knowledge, grammar, problem solving, critical thinking, reasoning, and non-cognitive skills such as understanding people, individual learning styles and personality traits. (Andrich et al., 2017; Bala et al., 2022; Griffin et al., 2021; Riley and Gouveia, 2022.) Standardised tests are used for monitoring and assessment purposes and are typically used when testing large groups. The aim of standardised tests is to provide consistent conditions (i.e., standard items, scoring and interpretation). This enables objective assessment. (Huber et al., 2022; Morris, 2011.) Recent literature indicates that standardised tests predict future academic performance (Gauer and Jackson, 2017; Haavisto et al., 2019; Huber et al., 2022). However, there is conflicting evidence on the predictive validity of aptitude tests at least in medical student selection. Furthermore, although the interviews and references are commonly used selection methods, the research results indicate that traditional interviews and references lack the reliability and validity that would be expected of an instrument in a selection setting. (Patterson et al., 2016.)

In Finland, social care and healthcare applicants usually must have at least 12 years of education (high school or vocational school) prior to the bachelor level education (Universities of Applied Sciences Act 932/2014) and previously the entrance examinations have typically been emphasised as the main student selection method in higher education (Ministry of Education and Culture, 2016; Talman, 2014). The social care and healthcare student selection in UASs have previously included combination of GPA (i.e., high school diplomas or equivalent certificate GPA and certain grades such as language and mathematics) and on-site entrance examination. The on-site entrance examinations in social care and healthcare have previously included psychological aptitude tests and individual and group interviews. (Rantanen, 2004.) Finnish UASs also use health requirements for selection meaning that an applicant whose health or functional capacity disables managing the practical tasks or clinical practice cannot be selected (Universities of Applied Sciences Act 932/2014).

The Finnish government program (2017-2020) aimed to reform the existing student selection system in higher education. The student admissions reform aimed to streamline and accelerate the transition to higher education and to improve the student selection. The universities and UASs started to develop their student selection practices as part of the reform. Now most higher education students in Finland are selected based on their matriculation examination certificate and vocational education and training grades. Thus, certificate-based admissions will be the main route to higher education. However, the applicants that did not get accepted with the certificate can still apply through the entrance examination. The student selection assessment has been changed so that applicants will not have to prepare for them in advance. During the reform UASs introduced a national joint digital entrance examination (UAS Exam), which was developed for all undergraduate degrees, where education was provided in Finnish. (Ministry of Education and Culture, 2022c.) The purpose of the UAS Exam is to examine the abilities needed to succeed in the UAS studies and thus reduce dropout rates, but also to help selection decisions setting the applicants in rank order based on their UAS Exam scores. It includes several parts, where some are mandatory for all applicants no matter which degree they are applying. Some parts are specific for some study fields, for example social care and healthcare applicants have also specific parts that are mandatory for them. The UAS Exam measures social care and healthcare applicants' reasoning, language- and communication, mathematical, ethics and emotional intelligence abilities. The selection is based on overall performance, not on individual test part's scores. However, applicant needs to achieve a minimum score from each part. The UAS Exam is taken under supervision. (Vierula et al., 2021.)

There is a growing need to determine fair and valid student selection methods in social care and healthcare programmes (Coyle et al., 2011; Leinster, 2013; Patterson

et al., 2016; Talman et al., 2018a; Talman et al., 2018b). The selection methods have moved towards more evidence-based models of selection aiming to assess attributes indicating academic performance and the research assessing of non-cognitive abilities such as motivation, emotional intelligence, ethics and empathy during the student selection has been increased (Patterson et al., 2016). However, the research on non-cognitive selection criteria is still scarce and most of the studies assessing social care and healthcare student selection have been concentrating in traditional cognitive abilities such as mathematics (Levinger and Segev, 2018; Talman et al., 2018a). This can lead to incorrect selection assessments (de Boer and Van Rijnsoever, 2022). However, previous research indicates that comprehensive (i.e., including cognitive and non-cognitive contents) assessment in student selection is recommended (Leinster, 2013; McGinley, 2020; Patterson et al., 2016; Taylor et al., 2014).

2.1.3 Standards for high-stakes test development

Social care and healthcare student selection is a situation which can have serious consequences for applicants, higher education institutions and societies. Thus, the student selection can be considered as a high-stake testing, which should be fair and valid for all applicants. This requires that the selection methods should be objective. (Stobart and Eggen, 2012.) Furthermore, higher education institutions responsibility is to select students with fair and valid selection criteria that should predict student success (de Boer and Van Rijnsoever, 2022).

High-stake tests should be developed, used, and implemented properly to provide benefits to both applicants and higher education institutions (i.e., fair and valid assessment selecting the best applicants) (American Educational Research Association, American Psychological Association & National Council on Measurement in Education, 2014). In high-stake tests, validity refers to the level how well the tests content and test scoring are suitable for proposed use, including the evidence for content the test is intended to measure (content validity), response processes and the consequences of the test for the participants and test providers (i.e., applicants and higher education institutions). Validation of the test's construct can be obtained with empirical evidence such as previous literature, use of the evidence of similar tests and expert judgement. (American Educational Research Association, American Psychological Association and National Council on Measurement in Education, 2014.)

From the student selection perspective, aim is to develop tests that can arrange applicants in rank order based on their performance. Thus, both the difficulty level of the items is important and the test´s ability to differentiate applicants' skills in the upper ability level (Gierl et al., 2017; Tavakol et al., 2014). Typically, high-stake

tests consist multiple choice questions where one response option is correct (Gierl et al., 2017). The quality of distractors (i.e., incorrect response options) is essential, because the test should include items that are difficult enough that not all can pass, and the correct response option should not be easy to guess (Chiu and Camilli, 2013; DeVellis, 2017; Gierl et al., 2017; Li et al., 2019). The aim is to create functional distractors that are tempting to choose but are unambiguously incorrect (Gierl et al., 2017). The items should be unambiguous (i.e., clarity of the items and response options) to ensure the fair and valid selection.

Classical Test Theory (CTT) has been successfully used in psychometric evaluation of tests for decades. CTT include validity and reliability measurements such as factor analysis, correlations, and Cronbach's alpha. These measurements are valid for psychometric testing, however, the CTT has some limitations, when considering the detailed item level evaluation (i.e., item difficulty and discrimination) and evaluation of the quality of distractors (De Champlain, 2010; DeVellis, 2017; Tavakol et al., 2014). Furthermore, in CTT approach the focus is on the characteristics of a test and the evaluation of the items (i.e., difficulty and discrimination) is affected by different samples (DeVellis, 2017). Furthermore, CTT is not recommended as the main approach to assess psychometric properties of tests, especially high-stakes tests (American Educational Research Association, American Psychological Association and National Council on Measurement in Education, 2014; Tavakol et al., 2014)

The Item Response Theory (IRT) was developed to concentrate on the characteristics of the items in the test and to separate the characteristics of the test and the sample (DeVellis, 2017; Tavakol et al., 2014; Yang and Kao, 2014). IRT models are explaining the relation between test-taker ability and the probability of a correct/incorrect item response (Tavakol et al., 2014). The focus of the IRT analysis is on the individual items, enabling the evaluation of different item parameters (DeVellis, 2017; Tavakol et al., 2014). Parametric IRT models can be one-parametric (i.e., including difficulty parameter), two-parameter (including difficulty and discrimination parameters) or three-parameter (including difficulty, discrimination, and pseudo-guessing parameters) (Sijtsma and van der Ark, 2022; Sulis and Toland, 2017). In IRT the student ability and item parameters (i.e., discrimination, difficulty, and pseudo-guessing) are transformed mathematically into an interval scale providing visual S-shaped logistic curve, Item Characteristic Curve (ICC) where different items' response options can be graphically analysed (Li et al., 2019; Ramsay et al., 2020).

The use of IRT approach is increasingly recommended for assessing the validity of high-stake tests with multiple choice questions. Although the importance of IRT has been emphasised in healthcare education, IRT is still scarcely used method in social care and healthcare studies. (Tavakol et al., 2014.)

There are several studies that have combined the CTT and IRT methods successfully in their psychometric evaluation. This approach gives comprehensive psychometric evaluation combining several different evaluation methods and giving the opportunity to verify different validation measurements with different methods. (e.g., Lin et al., 2021; Yang et al., 2020.)

2.2 The concept and assessment of emotional intelligence in social care and healthcare education

2.2.1 Conceptualisation of emotional intelligence

Emotions are present in our everyday life all the time. They influence our thinking, decision making, actions, social relationships, well-being, and physical and mental health (Izard, 2010; Morrison, 2007). The definition of emotion is not compatible (Cabanac, 2002; Izard, 2010). Panksepp (2000) describes emotion as a central system responsible for the integration and coordination of behavioural, cognitive and physiological responses to problems. According to the Morrison (2007) emotions express individual experiences and the collective experiences, indicating that emotions are linked to social context. Cabanac (2002) suggest that emotions are intense mental experiences that include high hedonic content.

The concept of EI was first used by Salovey and Mayer (1990), however the assumption that there exists intelligence beyond the traditional cognitive intelligence was already acknowledged earlier (Thorndike, 1919; Wechsler, 1940). Salovey and Mayer (1990) first studied why some individuals are more capable than others in processing emotional information and using this knowledge to guide their behavior. Later Goleman (1995) argued that people with EI excel in relationships at workplaces are best leaders. The recent studies indicate that EI is so called “hot” intelligence. “Hot” intelligences are considered as abilities that consists of noncognitive skills, e.g., the ability to interact with others in social situations, in contrast to the more analytical, “cold” traditional cognitive abilities, e.g., the ability to solve mathematical problems. The ability EI (but not self-report trait EI) is positively related with performance in “hot” cognitive tasks. (Chamorro-Premuzic, 2016; Gutiérrez-Cobo et al., 2016; Schneider et al., 2016.)

Despite of long research and study of the EI concept, there is no consensus for a single definition of EI. Salovey and Mayer (1990) suggested a social interaction model, where EI was introduced as a set of abilities including the appraisal, expression and regulation of emotions as well as the ability to use emotions for planning and motivation. Later Mayer et al. (2008) introduced more detailed concept including the verbal and non-verbal perception of emotions, management of

emotions in the self and others, and use of emotional content also in problem solving. Since this initial conceptualisation of EI by Salovey and Mayer (1990) several other definitions of EI have been proposed. Goleman (1995; 1998) introduced a broader definition, where EI was defined as the ability to distinguish emotions, to motivate ourselves, and to manage emotions in ourselves and in our relationships. His definition includes contents like self-awareness, self-regulation, motivation, empathy, and social skills. This is a much broader and incoherent definition of EI than Salovey's and Mayer's (1990) conceptualisation. Some researchers defined EI as an abstract construct with four components: appraisal and expression of emotion in oneself, appraisal and recognition of emotion in others, regulation of emotion in oneself and the use of emotion to facilitate performance (Davies and Stankov, 1998; Law et al., 2004). According to Bar-On (2006) EI can be defined as a collection of personal, emotional and social skills that affects person's ability to successfully cope with environmental pressures and demands.

Multiple conceptualisations of EI made the researchers divide the concept of EI in three different constructions: ability EI, trait EI and mixed EI combining both ability and trait construct of EI (e.g., MacCann et al., 2020; Table 2). However, all constructs of EI (ability, trait and mixed) include four concepts: the perception of emotions, expression of emotions, management of emotions in the self and others and ability to use emotions to achieve things and cope (Goleman, 1995; MacCann et al., 2020; Mayer et al., 2008; Petrides et al., 2016; Salovey and Mayer, 1990). However, the trait construct of EI also includes personality aspects such as optimisms, self-motivation, and empathy (Bar-On, 2006; Goleman, 1995; Levinger and Segev, 2018; Petrides et al., 2007). There is also a mutual agreement among researchers that EI is a distinct construct from traditional IQ and personality having additional validity above and beyond personality and general intelligence in different outcomes (Joseph and Newman, 2010; Petrides et al., 2007; Siegling et al., 2015; Vesely Maillefer et al., 2018).

There have been some studies trying to create theoretical models to connect the different constructs of EI. Joseph and Newman (2010) introduced their cascading model of EI where they aimed to connect the roles of perception of emotions, understanding of emotions, and managing emotions subcategories to work performance and connect to this model the cognitive intelligence and personality aspects. In this cascading model, EI can be seen as a causal system, a progressive process, where perception of emotions precedes understanding of emotions, which precedes managing emotions and work performance. Furthermore, in this model the conscientiousness (personality trait) is related to perception of emotions, cognitive ability was related to understanding of emotions and emotional stability (personality trait) was related to managing emotions. (Joseph and Newman, 2010.) Also, Schneider et al. (2016) introduced causal model of EI where four categories of EI

(perception of emotions, understanding of emotions, managing emotions, and utilising emotions) precedes and affects to other categories.

Three-Level-Model of EI was developed by Mikolajczak (2009). The aim was to combine ability EI and trait EI into the same model. This model consists of three levels of EI: 1) knowledge about what people know about emotions and how to deal with emotional situations, 2) ability to apply this knowledge in real situations, and 3) dispositions (traits) to behave in a certain way in emotional situations (i.e., typical behavior). The model has hierarchical structure indicating that knowledge serves as a base for ability, which in turn is base for dispositions. Thus, ability level requires knowledge and disposition level requires knowledge and ability levels. This model however does not provide information about how these components interact with each other. (Mikolajczak, 2009.) Seal and Andrews-Brown (2010) developed a theoretical model explaining how different constructs of EI interact predicting EI behaviour and environmental adaptation. This model connects emotional abilities (potential capacity of the individual), which moderates the mediated relation between emotional traits (preferred patterns of behaviour) and emotional competence (actual behaviour that effects performance) (Seal and Andrews-Brown, 2010).

Furthermore, Vesely Maillefer et al. (2018) introduced the model (PAT integrated framework) linking trait and ability EI and introduces new EI related component emotion information processing. In this model ability EI (emotional knowledge and its application), trait EI (a disposition toward a certain action) and emotion information processing are relatively independent and there is two-way interaction between all these components. In this model, different EI components do not necessarily contribute equally but they are always involved. Different factors such as context influences the magnitude of contribution in each EI component and the components predict performance both individually and when interacting with each of its counterparts.

It is also argued whether EI is a stable trait or ability that can change or be enhanced with educational interventions. Some studies have found that during the education the EI can be enhanced (Foster et al., 2017; Lee and Gu, 2014; Salminen-Tuomaala, 2020) while other studies have not found improvement in EI during the education or have found that even if some contents of EI are improving some might be declining (Orak et al., 2016; Shanta and Gargiulo, 2014). However, these studies have not researched confounding factors such as current life situation, stress level or mental well-being, which might have also impact on students' EI.

In this study, the concept of EI is based on the ability construct of EI (Mayer et al., 2016) because it allows the objective assessment of EI. Furthermore, according to previous literature, self-report measures such as Trait EI are not appropriate in student selection where results of the assessment have major impact both to the

applicants and higher education institutions (Rankin, 2013). In the student selection context, evaluation methods must be objective to ensure the fair selection of applicants.

2.2.2 Assessment of emotional intelligence in social care and healthcare education

Assessment of EI in this study refers to integrity including both the assessment of EI with certain instruments or tests that have exclusively been developed to assess EI and the assessment of the relationship of EI with different factors or outcomes such as study success, performance, wellbeing, gender, age, culture, and previous education.

Depending on the construct of the EI (i.e., ability EI, trait EI or mixed EI) different EI instruments exist. Most of the existing EI instruments are mixed, thus measuring both trait and ability EI (Table 2). However, most of these mixed EI instruments are using self-report measurements whereupon the instrument measures the respondents' opinion of their EI and thus it is not giving the objective assessment (Bar-On, 1997; Bar-On 2006; Boyatzis and Goleman, 2005; Schutte et al., 1998). The trait EI is also usually measured with self-report measurements (Petrides and Furnham, 2000). Self-report tests are not suitable to student selection where results of the assessment have major impact both to the applicants and higher education institutions. In the student selection, the evaluation methods must be objective to ensure the fair selection of applicants. (Rankin, 2013; Stobart and Eggen, 2012.)

The EI assessment in social care and healthcare education and student selection have included several different EI instruments assessing both trait and ability EI. Michelangelo (2015) discovered in her meta-analysis 25 different instruments that have been used to evaluate nurses or nursing students. In a systematic review, researching mainly medical students and professionals nine different EI instruments had been used in included studies (Arora et al., 2010). However, only few studies have assessed EI in student selection context (Arora et al., 2010).

Both EI constructs (trait and ability EI) are valuable in predicting behaviour and performance (Table 2). Trait EI has been linked in healthcare students to outcomes such as reduced stress (Arora et al., 2011; Sanchez-Ruiz et al., 2021), and higher educational achievement (e.g., Aithal et al., 2016; Snowden et al., 2018). Similarly, the ability EI has shown a wide range of positive outcomes in healthcare students, showing associations with stress, coping and academic achievement (e.g., Beauvais et al., 2014; Chew et al., 2013; Matthews et al., 2006; Naeem et al., 2014; Rode and Brown, 2019; Schneider et al., 2013). EI abilities such as understanding and managing emotions are critical to be successful in social work tasks such as assessment, observation, planning, decision making and interventions. EI is also

important for gaining co-operation with others and building resilience to be able to cope in stressful situations and complex relationships. Thus, EI is crucial ability for social work students and professionals. (Morrison, 2007.)

The previous studies indicate that social care and healthcare students might have higher than average EI (Aithal, et al., 2016; Joseph et al., 2015; Stanley and Mettilda, 2021; Štiglic et al., 2018). Štiglic et al. (2018) and Snowden et al. (2015) also discovered in their studies that healthcare students scored significantly higher in EI than engineering or computing students. However, some studies have indicated that healthcare students or applicants might have low scores in EI (Cerit and Beser, 2014; Talman et al., 2020). The applicants or students with low EI can have the risk for emotional burden, which can affect to the study success especially in clinical practise (Lewis et al., 2017).

The cultural aspect of EI in social and healthcare students has been studied, but scarcely (i.e., there is only few studies that have researched cultural aspect in social care and healthcare students and none that have researched it in student selection context), furthermore the results in these studies are controversial. Depending on the studies, different ethnic groups have had better EI compared to others whereas in some studies ethnic background has not influenced EI (Joseph et al., 2015; Todres et al., 2010; Van Rooy et al., 2005). There are indications that there might be cultural differences especially when considering the recognition of emotions (Elfenbein and Ambady 2002; Laukka et al., 2016; Masuda et al. 2008), even though there is also evidence that expression and recognition of emotions may be intercultural phenomenon (Scherer et al., 2011). However, these studies have not included social care and healthcare students and they have not been carried out in student selection context. Also, other factors such as age, experience, gender and previous education have had a relationship to EI in social care and healthcare students, but these results are also controversial either showing that there is no relationship between EI and these factors or indicating that relationship between these factors can be positive or negative depending on the study and the setting (e.g., Aithal et al., 2016; Arora et al., 2010; Asimopoulos et al., 2020; Carr, 2009; Cerit and Beser, 2014; Joseph et al., 2015; Khraisat et al., 2015; Snowden et al., 2015; Stanley and Metilda, 2018; Štiglic et al., 2018).

Earlier literature reviews have focused on the EI of social and healthcare applicants or students mainly in the medical field or in nursing (Arora et al., 2010; Bulmer Smith et al., 2009; Cherry et al., 2014; Johnson, 2015; Lewis et al., 2017; Michelangelo, 2015). Furthermore, all these reviews have assessed EI during the education not in student selection context. These reviews have not evaluated the validity of the EI instruments used to test the EI of students or applicants. Especially the social work literature relating to EI is scarce and there have been relatively little

studies published on EI and social work education or student selection despite its potential relevance for social work practice (Clarke et al., 2016; Morrison, 2007).

Table 2. Summary of emotional intelligence (EI) according to previous literature.

	Construct of EI	**Type of measurement**	**EI instruments**
Ability EI	emotion-related enhancing cognitive abilities such as perception, expression, and management of emotions	general ability-type objective measures	MSCEIT, GeCo, AVEI, STEM
Trait EI	emotion-related stable behavioural and self-perceived traits such as optimisms, self-motivation, and empathy	assessed using personality-type self-report measures	TeiQue-SF
Mixed EI	emotion-related abilities and traits such as perception and management of emotions, optimisms and empathy	objective and self-report measures	SSEIT, EQ-i, ECU

MSCEIT= Mayer-Salovey-Caruso Emotional Intelligence Test, GeCo= The Geneva Emotional Competence Test, AVEI= Audiovisual Test of Emotional Intelligence, STEM= the Situational Test of Emotional Management, TeiQue-SF= Trait EI Questionnaire Short Form, SSEIT= The Schutte Self-Report Emotional Intelligence Test, EQ-i= The Emotional Quotient Inventory, ECU= Emotional Competence Inventory-University. See more details about instruments in Paper I, Table 3.

3 Purpose, Aim and Research Questions

The purpose of this study was to 1) identify a relevant content of emotional intelligence to be assessed in undergraduate social care and healthcare student selection, 2) develop and psychometrically evaluate an emotional intelligence test (EMI-T) for the undergraduate social care and healthcare student selection in UASs and 3) to assess undergraduate social care and healthcare applicants' EI and factors related to it. The goal was to enhance undergraduate social care and healthcare student selection to be objective and more comprehensive and thus, equal. The ultimate goal was to enable the selection of applicants with sufficient EI to be able to interact adequately with the patients and their closed ones early on during the clinical placements and, thus improve the quality of care.

This study included three phases: theoretical phase, test development phase and evaluation phase.

I Theoretical phase

The purpose was to describe the content and psychometric properties of EI instruments used in undergraduate social care and healthcare education and student selection and to examine the relationship between EI and study success in undergraduate social care and healthcare students. Study success was defined as evaluation of grade point average (GPA), clinical performance, study progress (credit points), dropout or graduation rates. The evaluation of EI instruments was essential to find out if any of the existing instruments could be used in social care and healthcare student selection. Furthermore, it was essential to confirm if, EI has positive relation to study success and thus, should be assessed during the social care and healthcare student selection.

The research questions of theoretical phase were:

1. What is the content of the EI in undergraduate social care and healthcare student selection? (Paper I, Paper II)
2. What instruments have been used to assess EI of undergraduate healthcare students? (Paper I)
3. What are the psychometric properties of the instruments that have been used to assess EI of undergraduate healthcare students? (Paper I)
4. What is the relation between EI and study success in undergraduate healthcare students? (Paper I)

II Test development phase

The purpose was to develop and pilot test EMI-T in the undergraduate social care and healthcare student selection.

The research question was:

5. What is the content and structure of the EMI-T? (Paper III)

III Evaluation phase

The purpose was to evaluate the psychometric properties of the EMI-T and assess the EI of undergraduate social care and healthcare applicants and factors related to it.

The research questions were:

6. What are the psychometric properties of the EMI-T? (Paper III)
7. What is the EI of undergraduate social care and healthcare applicants? (Paper IV)
8. What factors are related to undergraduate social care and healthcare applicants' EI? (Paper IV)

4 Materials and Methods

This chapter describes the different quantitative and qualitative designs, settings, samples, data collection methods and analysis that were used in the study (Table 3).

Table 3. Overview of the designs and methods used across the study.

Phase	Paper	Design	Setting and sample	Data collection	Data analysis
I Theoretical phase 2018–2020	I	Systematic literature review	Previous empirical studies from CINAHL, ERIC, PsycINFO, PubMed, Scopus, and Cochrane Library Spring 2018 (n=22) and 2020 (n=26)	Systematic literature search	Inductive content analysis, Categorisation
	II	Descriptive qualitative design	5 groups in Spring and Autumn 2019 in participants' institutions Group 1: nursing educators (n= 6), Group 2: social work educators (n=6), Group 3: other healthcare educators (n=5). Group 4: clinical professionals from specialised healthcare (n=7), Group 5: clinical professionals from primary healthcare (n=6) Social care and healthcare educators and professionals from focus groups (n=12)	Semi-structured focus-group interviews (n=5) Structured questionnaire	Content analysis (deductive and inductive) I-CVI Inductive content analysis, I-CVI
II Test development phase 2020–2021	III	Descriptive and methodological design	2 consecutive expert panels in Summer 2020 (one round), Panel 1: PhD students (n=6), post-doctoral researchers (n=5) from one university, Panel 2: Social care and healthcare educators (n=6) from four UASs	Structured questionnaire	Inductive content analysis, I-CVI,
		Descriptive and methodo-logical design	First pilot study Autumn 2020 First semester social care and healthcare students from two UASs (n=346)	The 73-item EMI-T	Descriptive statistics, IRT
		Descriptive and methodological design	Expert panel in Autumn 2020 (two rounds) Social care and healthcare educators from three UASs, (Round 1, n=10), (Round 2, n=8)	Structured questionnaire	Inductive content analysis, I-CVI
		Descriptive and methodo-logical design	Second pilot study Spring 2021 First semester social care and healthcare students from two UASs (n=205)	The 42-item EMI-T	Descriptive statistics, IRT
III Evaluation phase, 2021	III	Cross-sectional design	Spring 2021 during the UAS Exam Social care and healthcare applicants (n=4808)	EMI-T, demographic factors	Descriptive statistics, correlation coefficients, IRT
	IV	Cross-sectional design	Spring 2021 during the UAS Exam Social care and healthcare applicants (n=4808)	EMI-T, demographic factors	Descriptive statistics, Analysis of variance, Tukey's test, multiple linear regression analysis

I-CVI= Item Content Validity Index, IRT= Item Response Theory, EMI-T= Emotional Intelligence Test

4.1 Study designs, settings and samples

This study was conducted in three phases (theoretical phase, test development phase and evaluation phase) between 2018 and 2021. Different designs, settings and samples were used to ensure the quality of the study (Table 3).

The theoretical phase

In this phase, study designs were systematic literature review and descriptive qualitative design. The methods were a systematic literature search and focus group interviews.

The systematic literature review was chosen to comprehensively search the research evidence and gather available knowledge about the relevant content of EI in social care and healthcare student selection and evaluate the existing EI instruments and relationship between EI and study success in social care and healthcare students (Grant and Booth, 2009). The search was performed using an adapted version of the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) flowchart (Moher et al., 2009). The review included four steps: 1) identification of the studies from the databases (n=3125), 2) screening the studies based on title and abstract according to the inclusion and exclusion criteria (n=48), 3) reviewing remaining full articles for eligibility and conducting the manual search from the full articles references (n=28) and 4) evaluating the quality of the articles (two studies were excluded, n=26) (Paper I.) The systematic review was conducted 2018 and the review was updated 2020 prior to the test development phase to ensure that no relevant new information regarding the test development was missed (Paper I). First systematic review included 22 articles and updated review 26 articles. Inclusion criteria were empirical and quantitative study, the use of an EI instrument in the study, participants as undergraduate healthcare applicants and/or students from medical, psychology, nursing, allied health or therapy-related fields and objective assessment of relation between EI and study success (Paper I). There were no studies identified from the field of social care/sciences. Thus, the Paper I only included the healthcare students and applicants.

Focus group interview was chosen as a method, because group interviews could be expected to provide richer data than an individual approach through the interaction and conversations between the participants (Doody, et al., 2013; Polit and Beck, 2012). Descriptive qualitative design was used to identify the relevant content of the EI to be assessed as part of social care and healthcare student selection (Doody et al., 2013; Polit and Beck, 2012). Five focus group interviews (n=30) were conducted 2019 in participants' workplaces. The semi-structured group interviews were guided by six predetermined themes formed from the results of the content analysis of the systematic review: perception of emotions, understanding emotions, emotional management, emotional expression, utilising emotions, and emotional

awareness in social contexts. For each theme, the interview questions were: How would you define this theme? and What EI content should be assessed when selecting social care and healthcare students? (Paper II). In a qualitative study, purposively sampling is often used to achieve deep understanding of the research topic and to use research resources effectively (Palinkas et al., 2015). Purposive stratified sampling was used in this study to ensure that the sample included various social care and healthcare educators and professionals (Polit and Beck, 2012). Three groups included social care and healthcare educators (n=17) and two groups included social care and healthcare professionals (n=13), who worked in clinical settings (Paper II).

Descriptive qualitative design was used to ensure the content validity of the EI categories that were formed after the data analysis of the interviews. The purpose was to evaluate the relevance and measurability of the identified EI main categories from a student selection perspective. A structured questionnaire was used. All the participants from the focus groups were asked to participate and 12 participated (response rate 40%) (Paper III). The results of the theoretical study phase (systematic literature review, focus group interviews and structured questionnaire to focus group interview participants) formed a theoretical basis for the EI categories and thus for the test development phase.

The test development phase

Descriptive and methodological design was used to 1) develop an emotional intelligence test (EMI-T) for the undergraduate social care and healthcare student selection and 2) pilot test the developed EMI-T. This phase included three expert panels and two pilot studies (Paper III).

Descriptive design with two consecutive expert panels were conducted with email questionnaire in June and August 2020 for content validity evaluation of the first versions of EMI-T (panel 1 with 100 items and panel 2 with 87 items; Figure 1). These panels had only one round. The purpose of the content validity evaluation was to examine if the test items represented the content of the test and if the operationalisation of the items were adequate (Cook et al., 2006; DeVon et al., 2007). The aim was to recruit eight to twelve participants in each panel, which is typical number of participants in expert panels. It is also crucial that participants have knowledge about the key construct (Polit and Beck, 2012.) Purposive sampling was used in this study to ensure that the experts had either experience in instrument development or of social care and healthcare student selection. The experts for the first panel were recruited with the open invitation letter that was sent with email to all possible participants in one university. The experts in first panel were doctoral students and post-doctoral researchers (n=11) with knowledge of instrument development. For the second panel, the social care and healthcare educators were recruited through the contacts in

Development Project for Student Selection in Finnish Universities of Applied Sciences. The second panel included social care and healthcare educators (n=6) who had significant working experience (5–34 years) and had experience with entrance examination. Most of the experts had both developed and organised entrance examinations or had experience in evaluating the applicants. (Paper III.)

The pilot test to evaluate the 73-item version of the EMI-T was conducted in autumn 2019 in two UASs using methodological design. The contact persons were recruited through the contacts in the Development Project for Student Selection in Finnish Universities of Applied Sciences. Both UASs had contact person that provided the contact with the educators, whose student groups were invited to the pilot test. First pilot study included 346 first-year social care and healthcare students: physiotherapy students (n=25), biomedical laboratory science students (n=31), nursing students (n=183), paramedic students (n=33) and social science students (n=74). Purposively sampling was used to ensure that the sample included various social care and healthcare students. (Paper III.)

Descriptive design was used to evaluate the content validity of the modified items, or the new items generated after the first pilot study (37 modified items and eight new items). Third expert panel in winter 2020 had two rounds. The social care and healthcare educators for this expert panel were recruited through the contacts in Development Project for Student Selection in Finnish Universities of Applied Sciences. The panel included experienced social care and healthcare educators. The first round had 10 experts and second round had 8 experts. (Paper III.)

Methodological design was used to pilot test 42 modified items after the expert panel (Figure 1). The study was conducted in January 2021 in two UASs. The contact persons were the same than in the first pilot study and they provided the contact with the educators, whose student groups were invited to the pilot test. The participants were 205 first-year healthcare students: physiotherapy students (n=35) and nursing students (n=170). Purposively sampling was used to ensure that the sample included different social care and healthcare students. (Paper III.)

The evaluation phase

A cross-sectional design was utilised to evaluate psychometric properties of the EMI-T (Paper III) and social care and healthcare applicants' EI and factors related to their EI (Paper IV). The study was conducted in Spring 2021 during the entrance examination. The participants were social care and healthcare undergraduate applicants that participated to the UAS Exam 31st of May or 4th of June, answered in EMI-T and gave their consent to participate in the study (n=4808). Altogether, 21,916 social care and healthcare applicants participated to the UAS Exam in spring 2021. The study population represented 22% of all applicants.

4.2 Data collection

The theoretical phase

In this phase, data collection methods were systematic literature search and focus group interviews. In a systematic literature review 6 electronic databases were searched (CINAHL, Eric, Scopus, PubMed, PsycINFO and Cochrane Library). In the preliminary search, also the Finnish database (Medic) was searched, but Finnish studies within the inclusion and exclusion criteria were not found. The literature search was limited to studies in English language with abstract available. Data screening was conducted in four steps. First, citations were identified and screened based on the title, according to the inclusion/exclusion criteria. Next, duplicates were removed, and abstracts were screened. In the eligibility phase, full text articles were read independently by two researchers and 22 of those articles were included in the study. The reference lists of the full text articles were searched, and six additional articles were included. After conducting a full text search, 28 studies were selected for the review. Two researchers participated in the selection and quality assessment of the articles using an adapted version of the Joanna Briggs Institute's checklist for Analytical Cross-sectional Studies (Joanna Briggs Institute, 2014). Two articles were rejected after the quality assessment. Articles that received at least half of the maximum scores were included. As only whole numbers were used, the cut-off score for cross-sectional studies was 3/7 and for longitudinal studies 4/9. Ultimately, 26 articles were included in the review. (Paper I.)

The semi-structured focus group interviews (n=5) were carried out based on the results of the systematic review (Paper II). The participants (n=30) received background material of the content of EI before the interviews (i.e., six EI main categories that were used as themes in the interviews). The interview questions for each theme were How would you define this theme? and What EI contents should be assessed when selecting social care and healthcare students? The participants' demographic information was collected in the beginning of the interview. The interviews lasted from 80 to 87 minutes and took place in meeting rooms at the participating institutions. The interviews were conducted mainly by one researcher. All interviews were audio-recorded, and recordings were transcribed word-for-word, disregarding irrelevant vocalisations (Paper II; Polit and Beck, 2012).

A structured questionnaire (word document) was emailed to all participants from the focus groups to further evaluate the content validity of the EI categories based on the results of the focus group interviews. The response rate was 40% (i.e., 12 out of 30 participated). The questionnaire included 20 four-point Likert-type questions to evaluate the relevance of the EI categories from the student selection perspective (extremely relevant to not relevant) and measurability of the EI categories during a digital entrance

examination using objective measurements with a dichotomous (yes/no) scale. (Paper III.) The questionnaire had also open-ended response options, so the participants were able to leave comments on individual categories or overall, about the assessment of EI during the student selection. The experts first saved the questionnaires into their computers, responded, and then emailed the filled questionnaires without names or any other identification information to the main researcher, who saved them anonymously (i.e., researcher saved filled questionnaires without any identification information).

The test development phase

After item generation (see chapter 4.3) the test development phase included several data collections: three expert panels and two pilot tests (Paper III) (Table 2). A structured questionnaire was used in expert panels to evaluate the content validity of the items. The experts were asked to evaluate clarity, relevancy, and representativeness of the items. These variables were evaluated using a dichotomous scale (yes/no). The questionnaires included open-ended response options for experts to make suggestions on how the items could be enhanced. The questionnaire was emailed to the experts. The experts filled the questionnaire and emailed it back to the main researcher. The responses were saved anonymously (i.e., filled questionnaires were saved without any identification information).

In the first pilot test, the 73-item version of EMI-T was used and in the second pilot test, 42-item version of EMI-T was conducted (Paper III; Figure 1). In both pilot tests, the students took the EMI-T during their mandatory class. However, the participation was voluntary. The EMI-T was implemented as an electronic Webropol form and both written information about the research and the link to the test was delivered to the contact person (i.e., educator of the participating student group) before the pilot tests. The pilot tests were conducted during the Covid-19 pandemic. Thus, most of the classes were held online. The main researcher participated into the beginning of the classes and introduced the research topic and relevancy of the research to the students and answered to the questions if needed. In the beginning of the electronic Webropol form was written consent that students needed to fill prior to the EMI-T. The link for the EMI-T was open only during the classes for the students to answer. The students used their own phones or computers to fill the EMI-T under supervision.

The evaluation phase

This phase was conducted with cross-sectional design. The EMI-T was used to collect data from the social care and healthcare applicants who took the digital UAS Exam under supervised conditions. The final version of the EMI-T consisted of 20 multiple-choice items in four EI subscales (Paper III; Paper IV). The demographic

factors from the applicants were collected prior to the UAS Exam including factors such as age, gender, background education, applicant's place of birth, participation into the couching courses, applicant's parents' place of birth and employment status. (Paper III; Paper IV.)

4.3 Instrument

The EI test (EMI-T) was developed in 2018-2021. The development process included two stages: 1) construction and item generation of the EMI-T and 2) content validity evaluation and pilot studies (Figure 1).

The first stage including the construction and item generation of the EMI-T included systematic literature review, focus group interviews and items generation. The construction of the EMI-T was based on the results of the theoretical phase (systematic literature review, focus group interviews and structured questionnaire for the participants of focus group interviews) of this study (Paper I; Paper II). Item generation (Paper III) was based on four principles: 1) the number of initial items in each EI category had to be large enough to ensure the conceptual adequacy of the test during the validation process, 2) the items had to be relevant to the content representing comprehensively all EI categories, 3) the items and response options needed to be clear and unambiguous (DeVellis, 2017) and 4) the quantity of response options had to be optimal to reduce the possibility of guessing (Gierl et al., 2017). The preconditions for the entrance examination were considered in the development process (i.e., digital format, minimum passing score, and multiple-choice questions with one correct response option).

The second stage content validity evaluation and pilot studies included three expert panels and two pilot studies ensuring that every time the items were adapted, or new items were created they were evaluated before further development. (Paper III, Figure 3; Figure 1.) New items were generated to those EI categories where several items were removed during the validation process to ensure the conceptual adequacy of the test.

The final version of EMI-T included 20 multiple-choice items (case-based questions or questions related to emotion recognition from facial expressions) in four subscales: perception and understanding of emotions (8 items), acceptance of emotions (4 items), management of emotions (4 items) and social awareness and relations (4 items) (Paper III, Figure 3; Figure 1). The subscale of perception and understanding of emotions combined two EI categories and thus this subscale had double number of items compared to other subscales. Each item included one correct and three incorrect answer options. Each correct response yielded to one point. Incorrect options yielded to zero points. The minimum score was set to five points, because some EI ability is required for the selection. The time limit for the EMI-T was twenty minutes. (Paper III.)

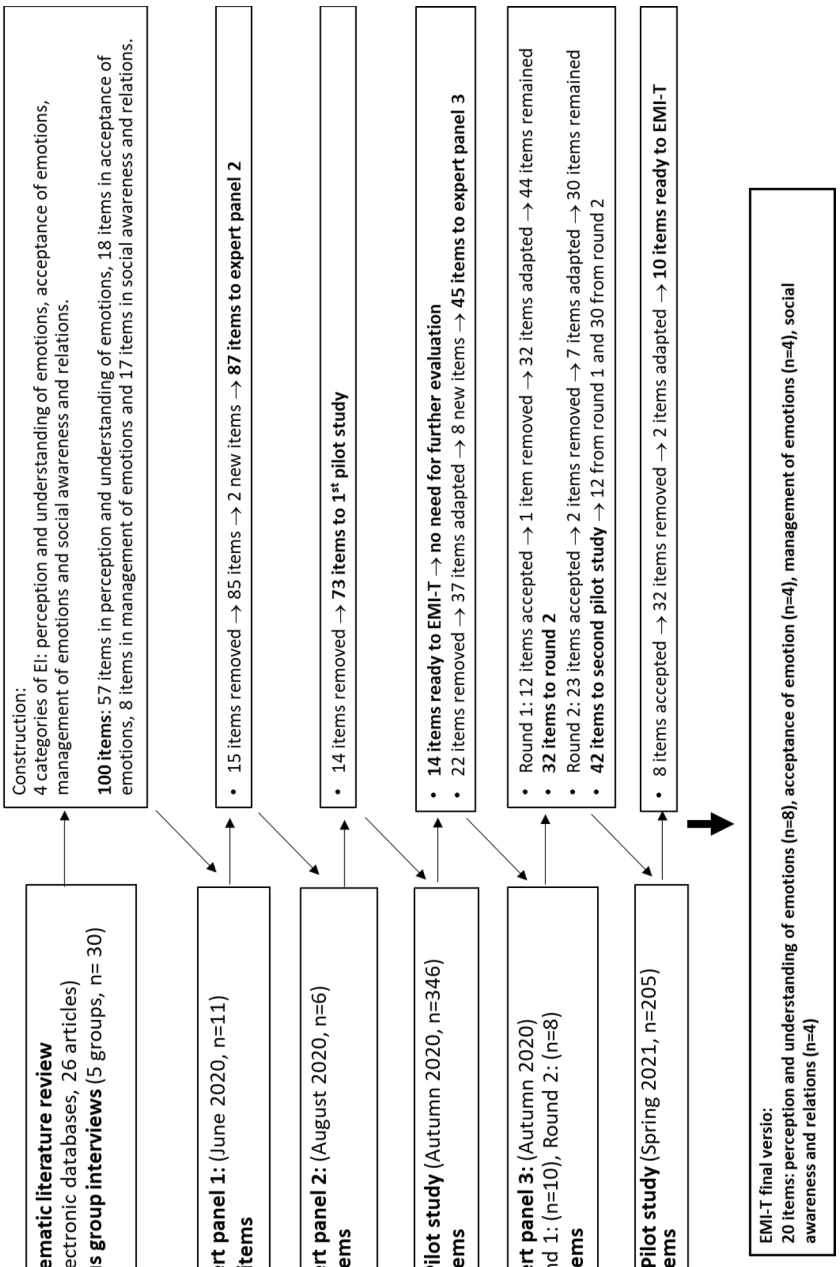

Figure 1. Development process of EMI-T.

4.4 Data analysis

The theoretical phase

In the systematic review (Paper I) the content of EI was analysed from the existing EI instruments (n=18) using inductive content analysis. The contents of EI (i.e. all EI main categories and sub-categories from each EI instrument) were collected to the matrix. After this EI main categories and sub-categories were organised into similarity-based units and the EI sub-components were formed from those similar units. After this the EI sub-components were organised into similarity-based units to form the EI main components. The EI main categories of the 18 EI instruments examined in the systematic review were used to rename the formed EI main components and to ensure that the EI main components formed from the inductive content analysis matched to the EI main categories discovered from the previous EI instruments.

The studies and EI instruments included to the review were summarised in individual tables. The information about the studies included the author(s), year, country of origin, aim of the study, design, participants, measured outcomes, and quality of the research articles. The information about the EI instruments included the content of EI gathered from the EI instrument(s) and a description of the instrument(s) and its reliability and validity. The relationship between EI and study success (academic performance, study progress and clinical performance) was first analysed from the results of the included studies using three categories (+ positive effect, 0 no effect, - negative effect) and the results of the studies indicating the relationship between EI and study success were further analysed using three levels (weak, r=0.1–0.2; moderate, r=0.3–0.4; strong, r=0.5–1.0) to describe the strength of the effect (Polit and Beck, 2012). Most of the studies used correlations or regression analysis as measurements to assess the relationship between study success and EI. Thus, the strength of the effect was analysed with three levels of correlation coefficient.

In the focus group interviews (Paper II), the data were analysed both deductively and inductively (Graneheim and Lundman, 2004). The six interview themes (perception of emotions, understanding emotions, emotional management, emotional expression, utilising emotions, and emotional awareness in social contexts) were used as a categorial framework for this analysis (Graneheim et al., 2017). The researcher listened to the recordings and read the transcripts several times to obtain a comprehensive understanding of the data (Polit and Beck, 2012; Paper II). The interview recordings were transcribed verbatim, omitting irrelevant vocalisations. All in all, the data comprised 72 pages of transcribed interviews. The data analysis was performed manually using Microsoft Word program. The meaning

units (words, sentences, or paragraphs) were identified from the transcripts (n=650) and were condensed to interpret the meaning of the original text (Elo and Kyngäs 2008; Graneheim and Lundman, 2004). The condensed meaning units were collected to the matrix under the deductive EI main categories. Inductive content analysis of each main category was performed to organise the units into similarity-based sub-categories within the main category. If units and sub-categories did not fit the deductive structure, a new EI main category was created (Graneheim et al., 2017). The main researcher conducted the analysis, but the results and process were documented, discussed, and agreed within the research group at each stage of the analysis (Elo et al., 2014; Paper II).

After the analysis of the focus group interviews analysis, a structured questionnaire was used to strengthen the content and construct validity of the EI categories and ensure the interpretation of the content analysis of the interviews. The relevance and measurability of the EI categories during a social care and healthcare digital entrance examination were evaluated and I-CVI was calculated. The content analysis was used for the open-ended responses. The questionnaire was sent to all focus group interview participants.

The test development phase

The data from the expert panels were analysed calculating each item's content validity index (I-CVI) with acceptable limit ≥ 0.78, (Polit and Beck, 2006). This acceptance limit was selected because there were at least six experts in each group evaluating the test items and getting 100% agreement of the experts is not likely. A questionnaire with 4-point Likert-type questions was used to determine whether items should be accepted or removed. (see chapter 4.3; Paper III.). The experts' open-ended comments were analysed with inductive content analysis (Paper III).

The data from the pilot studies were analysed with descriptive measures (frequencies and percentages) and IRT using graphical analysis of Item Characteristic Curves (ICCs) with TestGardener software (Paper III; Li et al., 2019) enabling full distractor analysis and detection of functional and dysfunctional items. (DeVellis, 2017; Li et al., 2019; Ramsay et al., 2020; Tavakol et al., 2014.) Item difficulty, pseudo-guessing and the function of the distractors were assessed visually from the ICC plots. More detailed description of the IRT analysis can be found in Paper III.

The evaluation phase

The psychometric properties of the final version of the EMI-T were analysed with descriptive measures (frequencies and percentages), Pearson's correlation

coefficient (0.10–0.39 weak correlation, 0.40–0.69 moderate correlation, 0.70–0.89 strong correlation and 0.90–1.00 very strong correlation, Schober et al., 2018) and IRT using graphical analysis of ICCs (Table 6). The data were analysed using Statistical Analysis Software (SAS 9.4®; SAS Institute Inc., 2015) and online version of TestGardener software (Li et al., 2019; Paper III). The EI of social care and healthcare applicants (Paper IV) was analysed using descriptive measures (frequencies and percentages) and Pearson's correlation coefficient. Analysis of variance (ANOVA) with Tukey's test in post-hoc multiple group comparisons were used to assess the factors related to applicants' EI and multiple linear regression was used to discover how the demographic factors explained the applicants' EI variation in student selection. (Paper IV). The data were analysed using Python programming language (Statsmodels libraries, 2022).

4.5 Ethical considerations

The good scientific practices and ethical principles of research were followed during the study. The study was carried out according to the responsible conduct of research (ALLEA, 2017; Finnish Advisory Board on Research Integrity, 2012). Ethics committee approval were sought for the different studies. From an ethical perspective, this study is acceptable and justified, because the results of the systematic literature review indicated that there was a need for research in this area and it was essential to develop a test to assess undergraduate social care and healthcare applicants' EI and enhance selection practices. This study produced new knowledge that can be used to develop and implement fair and objective selection practices in social care and healthcare student selection. The study maintained the voluntary participation, anonymity, and confidentiality of the participants in all phases. (Paper I-IV.)

The systematic literature review did not require an ethical approval or permission, since the data included previously published studies that were searched from the databases (Paper I). The ethical approval for focus group interviews was obtained from the Ethics Committee of the Higher Education Institution 14.4.2019 (Paper II). The participant organisations gave their permissions for the study. The participants were informed that participation to the study is voluntary, and participants' identity is protected during the study. They received an information letter prior to the interviews and were again provided with the information in the beginning of the interviews. Informed consents were sought from the participants. Anonymity of the participants was ensured by storing the data carefully (i.e. only the researcher had the access), removing all identifying details from the transcripts and from the study report. The description of the participants, their organisations and

positions were not reported in detail to ensure the anonymity. The interview data will be destroyed after the completion of the dissertational study. (Paper II.)

Ethical approval was obtained for the expert panels and pilot studies from the Ethics Committee of the Higher Education Institution 10.6.2020 (Paper III). Also, the participant organisations gave their permissions for the study. The participants were informed with the written information letter that participation to the study is voluntary, and participants' identity is protected during the study. It was also indicated in the information letter that e-mailing the filled questionnaire to the researcher was considered as a consent to participate to the study. Although, responses of the panelists were conducted via e-mail the responses were not connected to the participant's email address or name. Anonymity of the participants was also ensured by storing the data carefully (i.e. only the researcher had the access), deleting all identifying details from the study report. The description of the participants and their organisations and positions were not reported in detail to ensure the anonymity. The data will be destroyed after the completion of the dissertational study. (Paper III.)

Ethical approval for the psychometric evaluation of the EMI-T and assessment of the applicants' EI and factors related to EI during the entrance examination was obtained from the Ethics Committee of the Higher Education Institution 14.5.2021 (Paper III; Paper IV). The UASs participating in this study (n=20) gave their permissions for the study. The participants (4808 undergraduate social care and healthcare applicants) were informed that participation to the study is voluntary, and participants' identity is protected during the study. The invitation letter and data privacy document were published in the UAS Exam webpage which all applicants were requested to read thoroughly before the participation to the UAS Exam. Informed consent with the essential information about the research was obtained from the applicants electronically before they started the exam to ensure that the applicants understood their rights (voluntary participation, anonymity, and confidentiality of the participants) and the meaning of their contribution to the study. The participants were also informed that although the participant can discontinue the participation to the research at any time, it is not possible to remove the data that has been collected and analysed before the discontinuation. The pseudonymised data were provided to the researcher via the Development manager and Statistician of the Development Project for Student Selection in Finnish Universities of Applied Sciences. (Paper III; Paper IV.)

Obtaining ethical approval was considered extremely important in this study as student selections are considered high-stake situations where applicants may feel obliged to participate. Several procedures were followed to ensure applicants were aware that participation was voluntary. The applicants had access to the information letter several weeks before the entrance examination. Thus, they had time to consider

their participation. In the entrance examination, before the start of the examination, applicants were allocated time to log into the examination system, read the main points of the information letter and to give their informed consent. The information letter highlighted that the applicant's decision to consent/not to consent would not affect the selection process, and that the participating UASs would not have access to the consent or the collected data. Furthermore, as the UAS Exam was arranged nationally, applicants were able to select the entrance examination location, and many of the applicants did not perform the UAS Exam in the UAS they applied to.

5 Results

The main results of this study are presented in this section according to the study phases and research questions 1–8. The more detailed descriptions of the results are presented in the original publications I–IV.

5.1 The emotional intelligence and EI instruments in social care and healthcare education and student selection

The literature review and focus group interviews were used to identify a relevant content of EI to be assessed in undergraduate social care and healthcare student selection (Paper I; Paper II). In the literature review, the examination of the EI instruments served several purposes: 1) identifying the relevant content of EI, 2) evaluating the validity of the EI instruments used to assess healthcare applicants or students study success and 3) assessing the relation between EI and study success (Paper I).

The systematic literature review included 26 articles evaluating the relation between EI and study success in healthcare setting. Majority of the studies were published in the 2010s (range 2003–2019) indicating that although EI related research has over 30-year history, only recently the research has focused on the healthcare education and study outcomes. Half of the studies (13/26) were conducted in the USA (n=8) and in the United Kingdom (n=5). The included studies were mainly (20/26; 77%) from nursing (n=8) or medical (n=12) fields. Only three of the studies focused on applicants. As a result of the systematic review, 18 EI instruments that had been used to evaluate the relationship between EI and study success in healthcare applicants or students were identified. The identified instruments were either ability-based, trait-based or mixed-EI instruments containing both ability and trait skills. (Paper I, Table B.) As a result of the content analysis of the systematic review, six EI main categories were established: perception of emotions, understanding emotions, emotional management, emotional expression, utilising emotions, and emotional awareness in social contexts (Paper I, Table C.)

The participants in the focus group interviews were experienced social care and healthcare educators and professionals. The educators were mainly lecturers and

professionals were mainly social workers and nurses. Most of the participants were women (86.7%), had a higher education degree (76.7%) and they were 28–62 years old. The social care and healthcare professionals work experience was 14.2 years in average. Most of the educators had previously organised and evaluated entrance examinations (82.4%) and/or had participated in the development of entrance examinations (76.5%). The focus group interviews were guided by six themes retrieved from the results of the systematic review. Along with the six categories from the category framework (i.e. perception of emotions, understanding emotions, emotional management, emotional expression, utilising emotions and emotional awareness in social contexts), one additional category acceptance of emotions was discovered.

The results of literature review and focus group interviews yielded seven EI main categories and 20 subcategories to be assessed during the social care and healthcare student selection (Paper I; Paper II; Table 4 in summary). The results of the systematic review and focus group interviews both indicated that the comprehensive assessment including several different EI categories and using the EI total score seemed to be the best predictor of study success and thus, this approach should be used in student selection (Paper I; Paper II). However, based on the content validity evaluation of the identified EI categories, the emotional expression and utilising emotions were not evaluated as relevant and/or measurable in the student selection context (I-CVI < 0.78). The experts also expressed that objective evaluation of emotional expression during the digital entrance examination is not possible, and utilising emotions is an ability that enhances mainly during the education and is not something that necessarily should be assessed in the student selection phase. Furthermore, the categories of perception and understanding of emotions were combined, thus the experts indicated that these two categories would be difficult to measure separately, because it is not clear when the perception of emotions develops into the understanding of emotions. (Paper II.) Thus, 4 categories (perception and understanding of emotions, acceptance of emotions and management of emotions and social awareness and relations) were included to the EMI-T (Paper III).

Table 4. Concept of EI based on the results of systematic review and focus group interviews

Perception of emotions (I and II)	
	perception of own emotions: ability to recognise different emotions in oneself, recognise the emotions that certain situations or other people provoke and recognise own negative emotions. The ability to differentiate and name emotions.
	perception of others' emotions: ability to recognise verbally and non-verbally transmitted emotions.
	self-awareness: ability to know oneself and one's personality, ability to be aware of own actions. A realistic image of oneself and one's abilities. Healthy self-confidence but still humility regarding own abilities and learning needs.
Understanding of emotions (I and II)	
	understanding own emotions: ability to understand why one might be feeling in a certain way and what kinds of situations or other factors give rise to certain emotions. Ability to understand the reasons for own emotional reactions.
	understanding others' emotions: ability to understand the factors and reasons behind others' emotions and emotional reactions. Ability to understand that all emotions are permitted and accepted.
	understanding the meaning of emotions: ability to understand the meaning of emotions in one's own and others' actions, behaviour and interactions. Ability to understand the importance of emotions in social care and healthcare. Valuing emotions and emotional intelligence.
Acceptance of emotions (I)	
	confronting emotions: ability to confront own and others' emotions and emotional reactions. Ability to tolerate emotions and emotional reactions, especially the "negative" emotions and emotionally difficult situations.
	processing emotions: ability to process own emotions and processing others' emotions with them, especially the "negative" emotions. Ability to develop practices to process emotions.
	accepting own emotions: ability to be honest about own emotions and emotional reactions. Ability to accept all emotions as part of oneself.
	accepting emotions of others: Ability to accept others' emotions and emotional reactions. Ability to know when to set limits to others' emotional reactions and ability to defend those limits.
Management of emotions (I and II)	
	managing own emotions: ability to control own emotions, emotional reactions, and expressions especially in complicated situations. Ability to control own emotions, so that emotions do not govern own actions and decisions. Ability to prevent someone else's emotions transfer to you.
	emotional adaptability: flexibility in problem-solving and the ability to come up with different solutions in each situation. Ability to anticipate emotional situations and consequences of actions. Ability to link appropriately emotions and cognition in decision making and problem solving. Ability to mentalisation, resilience and optimism. Ability to tolerate stress.

Emotional expression (I and II)	
	non-verbal emotional expression: ability to appropriately express emotions non-verbally through body posture, position and appearance. Ability to use touch to express emotions and comfort.
	verbal emotional expression: ability to appropriately express own emotions in words or text. Ability to verbalise another person's emotions to indicate understanding.
Utilisation of emotions (I and II)	
	using emotions for own purposes: ability to use emotions for own purposes both positive (i.e., facilitating the appropriate atmosphere) and negative way (i.e., manipulating others).
	using emotions for others' purposes: ability to affect positively others' emotional states, manage another person's emotions to achieve goals, and use own emotional state to change the emotional atmosphere. Ability to emotional transference. Ability to use emotions for motivation and empowerment. Ability to recognise the potential of utilisation of emotions in a professional context.
Social awareness and relations (I and II)	
	social self-awareness: ability to recognise and knowledge own social status and personality. Ability and willingness to engage with other people in social situations.
	situational awareness: ability to sense the social situation and others' emotions and to modify own behaviour appropriately. Ability to recognise and understand socially acceptable emotional expression and behaviour in certain social situations. Ability to intuition.
	ability to consider others: ability to empathy, humanity, and a genuine willingness to be present and be with human beings. Ability to place oneself in another's position and show compassion. Desire to do good.
	ability to collaborate with others: ability to appropriate interaction and teamwork. Ability to listen to others, give them space, engage in dialogue and letting others talk without interrupting them. Ability to recognise and understand different roles, teams and societies and function appropriately within them.

I= Paper I, systematic review, II= Paper II, focus group interviews

The analysis of psychometric properties of the existing EI instruments revealed that most of the instruments' validity and reliability were poorly examined. The reliability reporting of the EI instruments varied. The internal consistency of the complete scale was reported for 15 of the instruments and five studies did not report any reliability results. Content validity was reported in four studies for four instruments, 17 of the studies did not mention validity at all. MSCEIT (ability-based instrument) and the different versions of Schutte's Emotional Intelligence Test (mixed-EI instrument) were the most often used and validated instruments. Only few of the EI instruments were purely objective and most of those objective instruments assessed only few EI categories (most included three to four EI main categories) or they were under licensure fee. Furthermore, most of the instruments were not validated for student selection context. (Paper I.) Thus, none of the instruments were suitable to be used in this study and the development of the new EI test was relevant.

According to the systematic literature review (Paper I), EI has relation to the study success especially with success in clinical studies. None of the different instrument types seemed to measure relationships between EI and study success any better than others. Most of the studies (22/26) found a significant positive relationship between EI and study success and none of the studies found negative relation. Most of the studies (20/26) reported relationships between the EI and academic performance whereas only three studies researched the relation between EI and study progress and nine between EI and clinical performance. Most of the studies (n=17) found statistically significant relationship between EI and academic performance. (Paper I.) In 11 studies, the relationship was at least moderate ($r<.30$). The relationship between EI and study progress was positive in two studies and the relationship between EI and clinical performance was positive in eight studies and in five of these the relationship was at least moderate ($r<.30$) (Paper I). Furthermore, only few of the studies (n=3) assessed the relation between EI and study success in student selection context. (Paper I.) Thus, the assessment of EI in student selection is relevant.

5.2 The psychometric properties of the EMI-T

The final version of EMI-T included 20 multiple-choice items in four subscales: perception and understanding of emotions (8 items), acceptance of emotions (4 items), management of emotions (4 items) and social awareness and relations (4 items) (Paper III, Figure 3; Figure 1). The subscale of perception and understanding of emotions combined two EI categories and thus this subscale had double number of items compared to other subscales. The psychometric properties of the developed EMI-T were evaluated with 4808 social care and healthcare applicants. Most of the applicants were female (80.3%) and had a high school or vocational school education

(84.3%). About half of the applicants were under 25 years old (51.7%). Only few (11.5%) had participated to a preparation course specifically tailored for entrance examination prior to the UAS Exam. (Paper III; Paper IV; Table 5.)

Table 5. Characteristics of the participants in the evaluation phase of the study

Characteristics	N	%
Gender		
Male	946	19.7
Female	3862	80.3
Age in years		
> 20	712	14.8
20–24	1772	36.9
25–29	824	17.1
< 29	1500	31.2
Background education *		
Vocational school	1920	39.9
High school	2134	44.4
Higher education	440	9.2
Other	314	6.5
Applicant's place of birth		
Finland	4484	93.3
Other	324	6.7
Applicant's parents place of birth		
Finland	3610	75.1
Other	1198	24.9
Applicant's parents' employment status		
Father		
Self-employed	857	19.0
Upper-level employee	628	13.9
Lower-level employee	790	17.5
Manual worker	1561	34.6
Student	28	0.6
Pensioner	465	10.8
Unemployed	160	3.5
Mother		
Self-employed	404	8.7
Upper-level employee	472	10.2
Lower-level employee	1167	25.1
Manual worker	1901	41.0
Student	64	1.4
Pensioner	416	9.0
Unemployed	217	4.7
Participation to the preparation course		
Yes	551	11.5
No	4257	88.5

*Applicants with both vocational and high school education were classified to applicants with high school diploma

There was a positive and statistically significant correlation between EI subscales and between subscales and the total score of EI. All EI subscales had a moderate to strong correlation with the total EMI-T score (r = 0.60–0.74) but had a weaker correlation with one another (r = 0.18–0.32) (Schober et al., 2018). The correlations between items were weak (r = -0.21−0.27). The item-to-total score correlations were positive (r = 0.18–0.40) and statistically significant ($p < 0.05$; Schober et al., 2018). Thus, the statistically significant results of the correlations supported the theoretical structure of the test, indicating that EI is based on different categories that have a significant correlation with one another but stronger correlation with the total score. (Paper III.)

The mean total score for the EMI-T was 15.92 (SD: 2.16), and the median was 16. The total score range was 0–20 indicating that some of the applicants got maximum scores, but also some did not score any points. In addition, the percentages of correct answers for EMI-T items varied from 36.2% to 99.1%. Only few of the applicants (n= 19) did not achieve the minimum pass score (five points) set for the EMI-T. To conclude, most of the applicants performed well in the EMI-T. (Paper III; Paper IV, Table 5.) However, the mean total score and the percentages of correct answers also indicate that the EMI-T discriminates at the upper ability level and that all applicants did not get a maximum score. This is important in the student selection process where the applicants need to be rank ordered to enable the selection decision.

The psychometric evaluation of EMI-T with IRT proved that the difficulty of the items was very easy or easy (n=17), indicating that either the correct response options were obvious or that the incorrect answer options failed to be functional distractors. Furthermore, thirteen of the items had high pseudo-guessing level (i.e., the probability of low-ability applicants to guess the correct answer option.) Altogether, five items were fully functional. The difficulty level for these items was at least easy (5–25%), the distractors were functional and the correct response options did not exceed the 30% threshold for guessing. (Paper III, Table 5; Table 6.) However, according to the IRT analysis all the items were unambiguous.

Table 6. Results of the descriptive statistics, difficulty and pseudo-guessing levels of the EMI-T.

Subscale/ Item	Correct answer (%)	Correct answer (n)	Difficulty levels	Pseudo-guessing levels	Mean (SD)	Range of the scores
Total EI score					15.92 (2.16)	0–20
Perception and understanding of emotions					5.34 (1.23)	0–8
1	75.6	3634	Very easy	High	0.76 (0.43)	0–1
2	91.1	4352	Very easy	High	0.91 (0.29)	0–1
3	36.2	1726	Difficult	Low	0.36 (0.48)	0–1
4	72.4	3473	Easy	High	0.72 (0.45)	0–1
5	44.9	2139	Moderate to difficult	Low	0.45 (0.50)	0–1
6	85.8	4121	Very easy	High	0.86 (0.35)	0–1
7	70.5	3383	Easy	Low	0.70 (0.46)	0–1
8	59.2	2833	Easy to moderate	High	0.59 (0.49)	0–1
Acceptance of emotions					3.41 (0.80)	0–4
9	94.5	4538	Very easy	High	0.94 (0.23)	0–1
10	86.3	4134	Very easy	High	0.86 (0.35)	0–1
11	93.5	4473	Very easy	High	0.93 (0.26)	0–1
12	67.9	3247	Easy	Low	0.68 (0.47)	0–1
Management of emotions					3.63 (0.65)	0–4
13	94.2	4518	Very easy	High	0.94 (0.24)	0–1
14	85.9	4112	Very easy	High	0.85 (0.35)	0–1
15	89.5	4281	Very easy	High	0.89 (0.23)	0–1
16	>95% of the applicants got the item correct				0.95 (0.23)	0–1
Social awareness and relations					3.54 (0.69)	0–4
17	>95% of the applicants got the item correct				0.99 (0.10)	0–1
18	76.4	3638	Easy	Low	0.76 (0.43)	0–1
19	92.00	4397	Very Easy	High	0.92 (0.28)	0–1
20	88.6	4226	Very Easy	High	0.88 (0.33)	0–1

Difficulty levels: 4 = Difficult (75–95%), 3 = Moderate to difficult (50%–75%), 2 = Easy to moderate (25–50%), 1 = Easy (5%–25%), 0 = Very easy (< 5%),
Pseudo-guessing: High (> 30%), Low (≤ 30 %), Items 16 and 17 were extremely easy (less than 5% chose the distractors) and IRT was not applicable.

5.3 Social care and healthcare applicants' emotional intelligence and factors related to it

The social care and healthcare applicants' EI and factors related to it were evaluated with 4808 social care and healthcare applicants, who participated to the UAS Exam in spring 2021 (Paper IV; Table 3). The social care and healthcare applicants' EI was above the centre of the score range (for total EI score the centre of the score range is 10) and only few of the applicants (n=19) did not achieve the minimum passing score (five points), indicating that they succeeded well in EMI-T (Paper IV; Table 6). The applicants scored well in all subscales but according to the mean scores of each subscale they seemed to perform best in management of emotions and least well in the subscale perception and understanding of emotions. Furthermore, 95% of the applicants did not achieve the maximum score on the perception and understanding of emotions, whereas in all other subscales half of the applicants achieved the maximum score (Paper III; Paper IV; Table 6). There was a weak positive and statistically significant correlation between subscales and between subscales and the total score indicating that the applicants that succeeded well in one subscale succeeded also in other subscales. (Paper IV.)

The applicants were mainly female, only few (9,2%) had higher education prior to the application, almost third (31,2%) were over 29 years old and most were born in Finland (93,3%). However, almost quarter (24,9%) of applicants had parents that were born somewhere else than in Finland. Analysis of variance (ANOVA) with Tukey's test in post-hoc multiple group comparisons was used to assess the factors related to applicants' EI. The applicant's older age, female gender, high school or higher education as a previous education, Finland as a place of birth, parents' place of birth in Finland and employment status (i.e., working versus unemployed or student) were associated to the better EI in applicants (Paper IV; Table 7).

Regression analysis was performed to analyse how well the demographic factors explain the variation in social care and healthcare applicants EI. According to the results, older age, female gender, high school or higher education as a previous education and applicant's or his/her parent's place of birth in Finland together explained better EI. However, these factors only explained 14% of the variation in EI total score ($R2= 0.141$, adjusted R2 0.139). Thus, there are other factors explaining the EI variation in student selection. This indicates that demographic factors used in this study had only minor influence in EI variation and results of EMI-T. Thus, EMI-T seems to be objective and equal selection method. (Paper IV.)

Table 7. Factors statistically significantly* related to social care and healthcare applicants' EI.

Factors related to EI total score	Difference between means	95% confidence interval
Age		
over 29y vs under 20y	0.32	0.05–0.59
over 29y vs 20–24y	0.34	0.13–0.54
Gender		
Female vs male	0.73	0.57–0.89
Background education		
Higher education vs vocational school	1.04	0.73–1.34
Higher education vs high school	0.51	0.21–0.81
Vocational school vs high school	-0.52	-0.70—0.34
Place of birth		
Applicant: another country vs Finland	-2.72	-2.96—2.47
Parents: Finland vs other country	0.68	0.53–0.83
Parents employment status		
Father:		
Student vs upper-level employee	-2.34	-3.60—1.07
Student vs lower-level employee	-2.28	-3.54—1.02
Student vs self-employed	-2.20	-3.46—0.94
Student vs manual worker	-2.17	-3.43—0.92
Unemployed vs upper-level employee	-1.10	-1.68—0.52
Unemployed vs lower-level employee	-1.04	-1.61—0.47
Unemployed vs self-employed	-0.96	-1.52—0.39
Unemployed vs manual worker	-0.94	-1.48—0.39
Unemployed vs pensioner	-0.79	-1.39—0.19
Pensioner vs student	2.03	0.75–3.30
Mother:		
Student vs upper-level employee	-1.31	-2.20—0.43
Student vs lower-level employee	-1.27	-2.12—0.41
Unemployed vs upper-level employee	-1.23	-1.78—0.69
Student vs self-employed	-1.22	-2.11—0.32
Student vs manual worker	-1.21	-2.06—0.37
Unemployed vs lower-level employee	-1.19	-1.68—0.70
Unemployed vs self-employed	-1.14	-1.70—0.58
Unemployed vs manual worker	-1.13	-1.61—0.66
Unemployed vs pensioner	-0.94	-1.50—0.38
Pensioner vs student	1.02	0.13–1.91

*p-values **≤.05,** Total scores of EI (EMI-T) as a dependent variable (analysis of variance with Tukey's test in post hoc multiple group comparison

6 Discussion

In this discussion chapter, the main findings of the study are discussed. In addition, the validity and reliability of the study, as well as suggestions for further research and the practical implications of the results are discussed. The Papers I–IV include more detailed discussions.

6.1 The assessment of emotional intelligence in social care and healthcare education and student selection

The purpose of the theoretical phase was to identify the relevant content of emotional intelligence to be assessed in undergraduate social care and healthcare student selection. The results of the theoretical study phase served as a base for the test development phase.

The results of the systematic review and focus group interviews identified seven EI main categories indicating that comprehensive assessment of EI is recommended (Paper I; Paper II; Table 3). These results are in line with previous literature as six of the EI categories identified in this study were also included into the previously developed EI instruments. However, the previous EI instruments at best only include four to five EI categories each (Paper I; Schutte et al., 1998; MacCann and Roberts, 2008; Mayer et al., 2003; Petrides and Furnham, 2006). In this study a new EI category acceptance of emotions was recognised. The social care and healthcare educators and professionals regarded acceptance of emotions relevant to measure during the student selection. They indicated that accepting emotions is crucial for appropriate performance and management of emotions. (Paper II.) The social care and healthcare education involves practical training in clinical settings early on during the studies. Thus, the students experience emotionally challenging situations during their education. It is essential that in clinical placements students can process their own emotions to buffer stress and successfully accomplish the clinical placements (Lewis et al., 2017). None of the previous instruments assess acceptance of emotions.

The purpose of the theoretical phase was also to describe psychometric properties of EI instruments used in undergraduate healthcare education and student

selection to assess relation between EI and study success. The evaluation of EI instruments was essential to identify potential existing instruments for social care and healthcare student selection. 18 different EI instruments were found. However, most of the instruments were not comprehensively psychometrically evaluated, or used in student selection context, or were self-report instruments (Paper I) or subjected to licence fees. Thus, the previous EI instruments were not suitable for student selection where comprehensive and objective assessment is crucial for equal selection (Rankin, 2013). Furthermore, many existing objective ability-based instruments included only one EI category (e.g., Audiovisual Test of Emotional Intelligence, The Situational Test of Emotional Management and The Situational Test of Emotional Understanding) and therefore lacked comprehensive assessment of EI. The most widely used ability-based EI instrument Mayer-Salovey-Caruso Emotional Intelligence Test [MSCEIT] includes only four EI categories. Many of the objective EI instruments are also licenced (e.g., MSCEIT) and their use in student selection including thousands of applicants is not financially possible. Thus, the need for developing comprehensive and objective instrument was recognised.

The purpose of the theoretical phase was also to examine the relationship between EI and study success in undergraduate social care and healthcare students. Study success was defined as evaluation of grade point average (GPA), clinical performance, study progress (credit points), dropout or graduation rates (Paper I). The assessment of the relationship between EI and study success was essential to confirm if EI is related to study success and should be assessed during the social care and healthcare student selection. The results of systematic review (Paper I) confirmed that EI has positive and statistically significant relation to the study success especially in clinical practice, although there were only few studies assessing EI in student selection context. Thus, research in student selection is scarce and further research is needed. (Paper I.) Social care and healthcare students encounter emotional situations in the clinical placements early on during their studies, thus abilities such as EI are relevant to decrease the emotional stress and burden to help students cope on clinical practice (Bulmer Smith et al., 2009; Lewis et al., 2017). Thus, these results confirm that social care and healthcare students EI should be assessed in the student selection phase.

6.2 The psychometric evaluation of the EMI-T for student selection

The one purpose of the evaluation phase was to evaluate the psychometric properties of the EMI-T. The content validity of the EMI-T was analysed several times during the development process (i.e., focus group interviews and three expert panels; Paper II; Paper III) and the descriptive measurements and IRT were used to evaluate the

psychometric properties of the EMI-T. The results of the content validity and psychometric evaluation (i.e., statistically significant correlations) provided support for the content validity of the developed test (Paper III) and confirmed that the EMI-T is based on the relevant and objectively measurable EI categories that should be assessed in social care and healthcare student selection. This however, required that also some easy items were included to the EMI-T to maintain content coverage and ensure that the test comprehensively measures the relevant content (Gierl et al., 2017). Assessing EI comprehensively is essential to confirm students' abilities to cope with the demands of social care and healthcare studies and especially the demands of clinical practise (Bulmer Smith et al., 2009; Lewis et al., 2017).

Although, according to the results EMI-T seemed to be fairly easy, the results indicated that the EMI-T to some extent differentiates the applicants' scores at the upper ability level. This is essential in the student selection context in which the aim is to rank order applicants to make selections. Furthermore, not all applicants got maximum scores, in fact only 5% of the applicants scored maximum scores in EMI-T. The revision of the dysfunctional distractors is needed to increase the difficulty level of the items. For example, in those items in which pseudo-guessing has been likely and most of the applicants have chosen the correct response (i.e., the items are also easy), the distractors should be more difficult and less obvious so that these could function as a tempting answer option. On the other hand, in those items in which pseudo-guessing has been likely but the distractors have been functioning properly, the layout and wording of the assignment should also be re-evaluated.

According to the psychometric evaluation the minimum score for the test was set to be relatively low (5 points out of 20), thus only few of the applicants did not reach the minimum score. However, previous studies indicate that social care and healthcare students seem to have relatively high EI (e.g., Aithal, et al., 2016; Stanley and Mettilda, 2021; Štiglic et al., 2018). Thus, the results could also reflect that social care and healthcare students tend to have good EI and perhaps this is one of the reasons for them to apply to this study field. Further research is needed to set optimal cut-off level for EMI-T (i.e., optimal minimal score to pass the test).

The student selection is a high-stake testing situation, where objective and valid selection methods should be used. (de Boer and Van Rijnsoever, 2022; Stobart and Eggen, 2012). The use of IRT approach is increasingly recommended for assessing the validity of high-stake tests with multiple choice questions (Tavakol et al., 2014). The IRT method with graphical analysis of the ICCs with TestGardener was used because it enables detailed item-level analysis and full distractor analysis (Gierl et al., 2017; Li et al., 2019; Tavakol et al., 2014). The graphical interpretation proved to be excellent in facilitating item-level analysis of difficulty, unambiguous and pseudo-guessing. It also enabled precise distractor analysis (Paper III).

6.3 Social care and healthcare applicants' emotional intelligence and associated factors

The purpose of the evaluation phase was also to assess with EMI-T the EI of undergraduate social care and healthcare applicants and factors related to their EI. The social care and healthcare applicants had EI above the centre of the score range. Thus, they seemed to perform well in the EI section of the UAS Exam and in all EI subscales. This indicates that applicants already have EI abilities in the selection phase. The results of previous studies indicate that social care and healthcare applicants seem to have better than average EI (Joseph et al., 2015; Aithal et al., 2016; Snowden 2018; Štiglic et al., 2018; Stanley and Mettilda, 2021). The explanation to better than average EI may be that having strong (in this case above average) EI abilities may inspire individuals to select social care and healthcare as a career choice. When the applicants have good abilities, it is important that the selected assessment methods can differentiate the applicants especially in the upper level of that ability. According to the results of this study, EMI-T can differentiate applicants at the upper ability levels, thus this further confirms that EMI-T can be used as an evaluation method in social care and healthcare student selection.

The applicant's demographic factors of age, gender, previous education, and place of birth had statistically significant relation to the EI. The applicants that were older, female, had a high school or higher education as a previous education and were born in Finland had better EI. (Paper IV). Also, the applicant's parents' place of birth and employment status had relation to the applicant's EI. These results are partly similar to the results of previous studies where older age, higher background education (Talman et al., 2020) and female gender have had positive relation to EI in healthcare applicants (Carrothers et al., 2000; Talman et al., 2020). Further research is needed because there are only few previous studies researching EI in the student selection context. (Arora et al., 2010; Paper I). The applicant's and his/her parent's place of birth seemed to have the greatest impact on EI total scores in student selection (paper IV). Those applicants, who were born in Finland had higher EI total scores. Also, those applicants, whose parents were born in Finland had higher total score of EI. Most of the applicants were born in Finland, but almost quarter had parents that were born in another country. Similar studies assessing cultural differences in EI in the context of social care and healthcare student selection or education do not seem to exist and the few studies have contradictory results. Thus, it is challenging to compare the results of this study to the previous studies. Further research is needed to establish what is the impact of culture on social care and healthcare applicants' or students' EI.

However, all the demographic factors only explained 14% of the social care and healthcare applicants' EI total score variation. Thus, there are still several unknown factors explaining EI in student selection. From the student selection point of view,

it is an important finding that factors such as age and gender do not affect the results of EMI-T. This finding supports that objective assessment and thereby the equal student selection is possible with EMI-T.

6.4 Validity and reliability of the study

The validity and reliability of this study have been ensured throughout the research process from different aspects. In this section, the validity and reliability of the research methods and educational high-stake test development are discussed and critically assessed.

In the theoretical phase, the literature search was conducted systematically using six international electronic databases (CINAHL, Cochrane Library, Eric, PsycINFO, PubMed and Scopus). Using several databases ensured the comprehensive search for the topic, which is essential to ensure quality of the research (Li et al., 2022) and increases the validity of the study. In addition, the same search was conducted from the field of social care to ensure that also the relevant articles in social sciences would be included. Also, the literature search was updated prior to the test development to find more recent and possible relevant studies in this field. The information specialist was consulted with the search phrase, which improved the quality of the search (Lefebvre et al., 2022). However, publication languages were restricted to English and Finnish only and abstract was requested. This might have excluded some relevant studies. The quality of the previous studies was assessed, using appropriate and generally approved appraisal tool, Joanne Brigg's Institute's checklist for Analytical Cross-sectional Studies. An adapted version was used to evaluate longitudinal studies by adding a question from the Case Series checklist (Joanne Briggs's Institute, 2014). Two researchers independently participated to the systematic search and evaluation of the studies, which improves the validity of the literature review process (Li et al., 2022). Overall, the quality of the included studies was good, but four of the included studies got less than half of the maximum quality points (3/7 cross sectional studies or 4/9 on longitudinal studies) and two studies were excluded due to the poor quality. The weaknesses in quality of the studies were usually due to the poor description of the instrument validation. Thus, including those studies with shortcomings in quality to the review might have hinder the results. However, the research on the relation of EI to study success in healthcare education or student selection is scarce, so those studies were necessary to include to get full view of the study outcome.

The focus group interviews consisted of five different groups including several different professionals to get comprehensive results. The participants were selected purposively to ensure that they had knowledge and expertise on social care and healthcare education and student selection. This enhances the quality of the results.

(Doody et al., 2013; Polit and Beck, 2006.) However, most of the focus group interviews had only one moderator, which may have affected to the data gathering. However, the data from focus groups were extensive and rich indicating that moderator did not restrict the discussion and the size of the focus groups was appropriate (Doody et al., 2013). The whole process of analysis was documented, discussed, and agreed upon within the research group, in which two of the researchers had several years of experience in undertaking qualitative data analysis, thereby enhancing the trustworthiness of the results. However, the results were not transferable due to the nature of the study and background of the participants. This was acknowledged by the researchers (Doody et al., 2013; Elo et al., 2014; Polit and Beck, 2006).

In the student selection context, it is important that the test measures comprehensively what the test is intended to measure. When considering the validity evaluation of the educational tests it is the interpretations of test scores for proposed uses that are evaluated, not the test itself and the validity should refer to interpretations for specified uses of the test. When considering student selection, the purpose of the test in student selection is to rank order applicants according to their test results to enable the selection of students. Thus, the focus in evaluation should be in function of the test and it's scores (discrimination, difficulty level, pseudo-guessing level and fairness of the test) and in content validity.

Validation of the test's content can be obtained with empirical evidence such as previous literature, use of the evidence of similar tests and expert judgement. (American Educational Research Association, American Psychological Association and National Council on Measurement in Education, 2014.) In this study, systematic literature review was conducted, where previous literature and previously used EI instruments were analysed. Furthermore, during the development process of EMI-T several focus group interviews and expert panels were conducted to establish expert judgement of the content and construct validity of EMI-T. The expert panels evaluated the items's clarity, relevancy and representativeness. However, the expert panels might have included same experts and the first versions of EMI-T were long including several items (first version 100 items and second version 87 items) making them time-consuming to assess. This might have affected to the evaluation of the experts, especially in the end part of the test. The participants in pilot studies were students who had just started their education prior to the pilot study. Thus, they represent applicants who have been selected for the programmes. Furthermore, in the pilot studies the EMI-T was conducted in class, but there was no such high-stakes situation as in the entrance examination. This might have affected their responses compared with their possible answers during the actual entrance examination.

From the perspective of the student selection the item level difficulty and function are essential for validity of the test to rank order applicants. Thus, IRT approach was used to achieve a greater understanding of the item level function and

to be able to do full distractor (incorrect response) analysis (Li et al., 2019; Tavakol et al., 2014). The study population was large (n=4808) enhancing the reliability of the analysis and enabling IRT analysis as a method. However, two items were easy (> 95% of the participants chose the correct answers) and for them the IRT method was not applicable. Thus, a full psychometric evaluation was not possible for these two items.

Fairness is a fundamental validity issue especially in high-stake educational test and requires attention in all stages of test development and use. A test that is fair reflects the same construct for all test takers, and test scores have the same meaning for all applicants in the intended population. Thus, a fair test does not advantage or disadvantage some individuals because of characteristics irrelevant to the intended construct. The demographic factors' relation to EI variation in student selection was evaluated. This confirmed that the fair student selection is possible using the EMI-T and demographic factors do not affect the results of the test. (American Educational Research Association, American Psychological Association and National Council on Measurement in Education, 2014.)

Construct validity was ensured with systematic review, focus group interviews, structured questionnaire to focus group interview participants, three expert panels and Pearson's correlations. In systematic review, the content of previous EI instruments (EI main categories and sub-categories) was analysed with inductive content analysis, and the presumed structure of EI were identified from the content of previous EI instruments. The results of the systematic review indicated that the EI instruments yielded similar structure including similar EI domains. In focus group interviews experienced social care and healthcare educators and professionals evaluated what EI content should be assessed in social care and healthcare student selection. Only one new EI main category (acceptance of emotions) was identified in addition to the review results. In structured questionnaire to focus group interview participants the presumed structure (i.e., EI categories) was further evaluated. The participants evaluated whether the EI main and sub-categories were adequate to assess during student selection and whether those categories were possible to measure during the student selection (i.e., in digital multiple choice entrance examination). In the test development phase, 3 expert panels were arranged to evaluate whether the item represent the EI main and sub-category which the item was intended to represent. The Pearson's correlations were calculated to ensure the structure validity of the EMI-T. The results of the correlations supported the theoretical structure of the test (page 51). However, other statistical measurements of structure validity such as factor analysis were not used. Although, the structure of EMI-T is similar to the known EI instruments, which structure validity have been assessed, it could have been valuable to further ensure EMI-T structure validity with

other statistical measurements than correlations to strengthen the structure validity assessment.

Reliability in the educational test development context can be seen as a general concept, which refers to the consistency of scores across replications of a testing procedure no matter how the consistency is evaluated or reported and not it's traditional definition, which refers to reliability coefficients of CTT. IRT approach views reliability as a fundamental quality of recognising better test items (DeVellis, 2017). In this study, reliability was ensured by observing the variance of the items (i.e., a graphical analysis of ICCs curves of different response options with TestGardener) and test scores (e.g., Mean/Maximum score, Centre of the score range, Standard deviation) and recognising items with high-quality (i.e., items with appropriate difficulty level, functional distractors, and low pseudo-guessing level. Thus, the reliability of the test was considered as part of the test validity (American Educational Research Association, American Psychological Association and National Council on Measurement in Education, 2014; DeVellis, 2017; DeVon et al., 2007; Ramsay et al., 2020).

Although, the EMI-T has been developed and validated to the social care and healthcare student selection context, the content and items of the test are not social care and healthcare related. Furthermore, the EI main categories of EMI-T are similar to the EI main categories of the previous EI instruments, which are internationally used and many of them are validated to the several different target populations in different countries. Therefore, the use of EMI-T is possible in other target populations and situations such as in student selection in other student groups. It could also be suitable to use in work life for example when recruiting new professionals. However, the validation of the EMI-T to these other target populations and situations should be performed before the deployment. The data to assess social care and healthcare applicants EI and factors related to their EI were gathered from national UAS Exam, so the data were geographically representative, and the sample represented 22% of all the social care and healthcare applicants (n= 21,916) at that entrance examination. This somewhat enables the generalisation of the results, thus the results of the applicants' EI and factors related to applicants' EI could be generalised to the Finnish social care and healthcare applicants. However, the results might have been different, if the situation where the participants took the EMI-T would have not been high-stake situation to the participants. In that case the results would not have been authentic. Thus, these results could not be generalised to other populations in situations without high-stake testing.

6.5 Practical implications

Based on the results of the study, following implications for social care and healthcare education and student selection can be outlined.

- Higher education institutions are recommended to assess the ability-based EI as part of social care and healthcare student selection process to ensure objective assessment in student selection.
- The EI of applicants should be assessed comprehensively including different EI subscales to the assessment and using total score of the EI instrument, thus comprehensive assessment of EI seems to predict study success in healthcare applicants and students.
- EMI-T is comprehensive and valid method to assess EI in social care and healthcare student selection. It is crucial to use assessment methods that ensure the applicants' equality in student selection.
- The EMI-T could be validated and used for other target populations such as other student groups or assessment of EI in recruiting situations.
- The assessed demographic factors only minorly explained the EI variation in the student selection in this study. This further supports the use of EMI-T as an assessment method in student selection enabling the equality in selection.

6.6 Suggestions for further research

According to the results of this study, the following suggestions for further research are presented.

- The further development of the EMI-T is needed to increase the difficulty level of the test. Especially the revision of the dysfunctional distractors and their further testing is needed.
- A follow-up study using EMI-T should be done to assess whether the EI at admission have impact on study success. Further research is crucial because there are only few previous studies measuring EI at student selection.
- Further research is needed to be able to define the optimal cut-off level of the EMI-T.
- Most of the studies researching EI and its relation to study success have been made with medical and nursing students. More studies including for example bachelor-level social science applicants, allied health and other healthcare-related disciplines are needed.

- In this study, demographic factors explained only minorly the variation of EI in student selection. Thus, further research is needed to establish what explains social care and healthcare applicants' variation in EI.

7 Conclusions

This study provided new knowledge about 1) EI's relation to the study success in social care and healthcare applicants/students, 2) content and methods assessing EI in social care and healthcare student selection and education, and 3) social care and healthcare applicants EI and factors effecting to EI variation in student selection. This study also provided new, objective, and comprehensive assessment method EMI-T to be used in social care and healthcare student selection.

- EI has positive relation to study success in healthcare applicants and students. Especially EI effects positively to the success in clinical studies.
- The EI should be measured objectively and comprehensively in student selection phase to ensure equality in student selection.
- EMI-T is a valid, objective, and comprehensive, but fairly easy EI test to be used in social care and healthcare student selection.
- Some demographic factors indicate poorer EI. Still these factors explained only minorly the variation of EI in student selection indicating that EI assessment with EMI-T seems to be equal to the applicants.

Acknowledgements

This study was carried out at the Department of Nursing Science, University of Turku, Finland. I received help, support and encouragement from several remarkable people during this dissertation process. I would like to express my gratitude to all those who made this doctoral dissertation study possible, although I cannot name everyone here individually.

First, I would like to express my deepest gratitude to my supervisors Professor Elina Haavisto, PhD Kirsi Talman and PhD Maija Hupli. I'm grateful for your continuous support and guidance. Your knowledge and experience of the research process and methods have helped me to make this dissertation and its sub-studies better, encouraged me to evaluate my work critically and develop my scientific thinking. You were always available and willing to help and support me. Your advices always got me back on the right track, and helped me focus on what was relevant. You have been guiding me through this research process and I would not have made it without you all.

I would like to thank my follow-up committee members Professor Helena Leino-Kilpi, Professor Minna Stolt and PhD Satu Kajander-Unkuri. Thank you for your encouragement, inspirational conversations and excellent comments and guestions that developed my scientific thinking and gave me understanding to improve my dissertation. I am deeply grateful for the official reviewers of my dissertation, Professor Kristina Mikkonen from the University of Oulu and Docent Hanna Hopia from the Jamk University of Applied Sciences. I am thankful for your excellent and accurate comments which helped me to improve my dissertation. Thank you Professor Maria Kääriäinen from the University of Oulu for accepting the invitation to act as my opponent.

I wish to thank PhD Jonna Vierula for your help and support during this dissertation process and co-writing of the articles. Our research topics and study designs were similar so your knowledge and help have been valuable during this dissertation process. I would also like to thank PhLic Eero Laakkonen from the University of Turku and MSc Ari Koistinen from Metropolia University of Applied Sciences for the statistical support and co-writing of the articles.

I would like to thank all teachers and professors at the Department of Nursing Science who have taught me and supported me during my studies. Especially, I would like to thank Professor Leena Salminen for your feedback in our seminar groups over the years. Warm thanks go to my fellow students in the Doctoral Programme in Nursing Science. Our discussions in the seminars and your feedback helped me to develop my research and thinking further. Special thanks to PhD Mika Alastalo, MNSc Jenni Rinne and MNSc Kristiina Rosqvist. My very special thanks goes to MNSc Niina Glerean and MNSc Eini Koskimies. Your support and encouragements have been crucial to me.

I owe a sincere gratitude to all social care and healthcare educators, professionals and students who participated in the different phases of the study, and all social care and healthcare experts for contributing to the evaluation of the instrument. I want to express my special thanks to all contact persons in Universities of Applied Sciences and healthcare units for enabling reqruitment of participants and data collection. I owe my gratitude to the members of the Reforming Student Selection in Nursing Education (ReSSNE) project and the members of the Development Project for Student Selection in Finnish Universities of Applied Sciences.

I wish to express my sincere thanks to my colleagues and work community in Finnish Nurses Association. I wish to thank the former chair Nina Hahtela for the support during my dissertation process. Furthermore, I want to thank my wonderful colleagues, and the whole work community for your flexibility and enabling my study leaves. Especially, I would like to thank my colleague Liisa Karhe for your encouragement and support during this dissertation process.

I am deeply grateful to all my family and friends. I am not able to list you all, but please accept my warmest gratitude. Thank you for your support and encouragement during this journey. My mother Raija thank you for your encouragement. Your help for taking good care of our children and offering help whenever needed was crucial for me to be able to finish my studies. I want to extend my deepest and loving thanks to my dear spouse Osmo. Without your support and understanding, this work would never have been completed. You have taken care of our family when I have sat at my desk writing in the evenings, weekends and in summer holidays. I would also like to thank all my friends supporting me during this process, especially my friend Mervi Flinkman for long conversations and mentoring during our walks and Hanna Kouki for listening my concerns and worries.

This study was supported financially by the University of Turku and the Finnish Nursing Education Foundation.

10.9.2023
Anne Pienimaa

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TURUN
YLIOPISTO
UNIVERSITY
OF TURKU

Painosalama, Turku, Finland 2023

ISBN 978-951-29-9438-0 (PRINT)
ISBN 978-951-29-9439-7 (PDF)
ISSN 0355-9483 (Print)
ISSN 2343-3213 (Online)