Dissertations in Health Sciences

UNIVERSITY OF
EASTERN FINLAND

HANISH BHURTUN

STRESS AND COPING STRATEGIES AMONG FINNISH NURSING STUDENTS IN THE CLINICAL LEARNING ENVIRONMENT

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ABSTRACT

The purpose of this thesis was to describe and explain the self-rated stress levels, stressors, and coping strategies that undergraduate bachelor's level nursing students employ in the clinical learning environment within the Finnish context. Also, the purpose was to evaluate an international stress scale and develop it further to measure Finnish nursing students' stress.

This thesis comprises of two sub-studies. Sub-study I (Article I) was an integrative review that explored previous literature on the topic of stress and coping strategies among undergraduate nursing students in their clinical learning environment. Sub-study II contained three parts. The first part of sub-study II (Article II) described the development of an instrument utilized to measure stress among Finnish nursing students. The second part of sub-study II (Article III) was a cross-sectional descriptive study that measured first-year nursing students' stress levels and identified stressors and coping strategies students used in their first clinical training. The third and last part of sub-study II (Article IV) was a two-wave longitudinal study that described and measured the changing levels of stress and coping strategies among the same cohort as they progressed to their second study year.

In sub-study I (Article I), 1,170 publications in total were screened from five databases. Consequently, the integrative review included 13 original publications. In the first and second parts of sub-study II (Articles II and III) a convenience sample (N = 189) of first-year nursing students from five participating universities of applied sciences contributed data in 2018. In the third part of sub-study II (Article IV), 131 second-year nursing students provided data for the follow-up in 2019.

Sub-study I (Article I) was based on the preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. For sub-study II, at both data collection time (2018, 2019), participants' sociodemographic data were collected as well as the Perceived Stress Scale and Coping Behaviour Inventory were used to collect data on stress and coping respectively. In sub-study II (Article II)

exploratory factor and confirmatory factor analyses were conducted to produce a valid scale that measured nursing students' stress accurately in the Finnish nursing education context. In the second part of sub-study II (Article III), t-tests and correlations were conducted to examine stress and coping among nursing students. In the third part of sub-study II (Article IV), related-sample tests were conducted to explore changes in stress and coping strategies within the same sample of Finnish nursing students.

Most previous studies that investigated stress and coping in the clinical learning environment among nursing students employed a cross-sectional design and reported that nursing staff and teachers, caring of patients, and lack of clinical knowledge as significant stressors in the clinical learning environment. Furthermore, students mostly employed problem-solving and transference to cope with their stresses (Article I). PSS 16 has 16 items under four factors; it is a valid and reliable tool that can accurately measure nursing students' stress in their clinical learning environment. The four factors are named as follows: Lack of knowledge and clinical skills; Workload and clinical settings; Teachers and nursing staff; and Caring for patients (Article II). Finnish first-year nursing students rarely experienced stress during their first clinical training (Article III). In the second year, they faced moderate levels of stress mainly from lack of professional knowledge and skills, assignments and workload, and the clinical learning environment. On both study years, the Finnish nursing students coped with their stresses using mainly emotion-focused coping strategies, including transference. However, there were some differences in the extent they reported using these coping strategies from the first to the second study year (Article IV).

Based on the findings of this thesis, nursing lecturers, preceptors, nursing staff are recommended to acquaint their nursing students in advance about the foreseeable evolution of stress and coping. Healthcare managers should consider the influence that the clinical learning environment has on nursing students' learning. Furthermore, policymakers can work on further improvements (e.g. a more favourable clinical learning experience, mentor education, and improving quality of supervision) to the clinical learning environment. A preliminary framework on stress and coping strategies for nursing students in the clinical learning environment is presented based on the results of this study. Future studies are needed to link specific coping strategies to stressors and explore the effectiveness of coping strategies.

Keywords: *Stress, Coping strategies, Nursing students, Clinical learning environment, Nursing education, Instrument development*

TIIVISTELMÄ

Tämän tutkimuksen tarkoituksena oli kuvailla ja selittää suomalaisten sairaanhoitaja-opiskelijoiden itsearvioimaa stressitasoa, stressitekijöitä ja stressinhallintastrategioita kliinisen harjoittelun aikana. Tarkoituksena oli myös arvioida kansainvälistä stressimittaria ja kehittää sitä edelleen suomalaisten hoitotyön opiskelijoiden stressin mittaamiseen.

Tutkimus koostuu kahdesta osatutkimuksesta. Ensimmäinen osatutkimus (artikkeli 1) oli integratiivinen kirjallisuuskatsaus, jossa analysoitiin aiempaa kirjallisuutta hoitotyön opiskelijoiden käytännön harjoittelujaksojen aikana kokemasta stressistä ja sen hallinnasta. Toiseen osatutkimukseen sisältyi kolme eri osaa, joista ensimmäisessä osassa (artikkeli 2) arvioitiin ja edelleen kehitettiin stressimittaria suomalaisten hoitotyön opiskelijoiden kliinisen harjoittelun aikaisen stressin itsearvioituun mittaamiseen. Toinen osa (artikkeli 3) oli poikkileikkaustutkimus, jossa selvitettiin ensimmäisen vuoden hoitotyön opiskelijoiden kokemaa stressiä, stressitekijöitä ja stressin hallintastrategioita. Kolmas osa (artikkeli 4) oli kaksivaiheinen pitkittäistutkimus, jossa selvitettiin saman kohdejoukon stressitasojen ja stressinhallintakeinojen muutoksia ensimmäisen ja toisen opiskeluvuoden välillä.

Ensimmäisen osatutkimuksen (artikkeli 1) integratiiviseen kirjallisuuskatsaukseen sisältyi kolmetoista alkuperäisjulkaisua viidestä eri tietokannasta haetusta 1170 julkaisusta. Toisen osatutkimuksen ensimmäisessä ja toisessa osassa kerättiin empiirinen aineisto vuonna 2018 viiden eri ammattikorkeakoulun hoitotyön opiskelijoilta (N=189). Kolmannessa osassa (2019) kerättiin seuranta-aineisto niiltä 131 hoitotyön opiskelijalta., jotka olivat vastanneet myös ensimmäiseen kyselyyn. Hoitotyön opiskelijoiden taustatietojen lisäksi ainestoa kerättiin Perceived Stress Scale (PSS) – stressikyselyllä ja CBI (Coping Behaviour Inventory) – kyselyllä. Aineistoa analysoitiin eksploratiivisella ja konfirmatorisella faktorianalyysilla arvioiden mittareiden luotettavuutta mitata suomalaisten hoitotyön opiskelijoiden itsearvioitua stressiä ja

stressinhallintastrategioita (artikkeli 2). Hoitotyön opiskelijoiden stressiä ja sen hallintaa tutkittiin t-testien ja korrelaatioiden avulla (artikkeli 3). Hoitotyön opiskelijoiden stressin muutoksia ja stressinhallintastrategioita analysoitiin kahden riippuvan otoksen t-testillä (artikkeli 4).

Tulosten mukaan useimmat aikaisemmat hoitotyön opiskelijoiden käytännön harjoittelujen aikaista stressiä ja sen hallintaa koskevat tutkimukset osoittavat, että hoitohenkilökunta ja opettajat ovat merkittäviä stressiä aiheuttavia tekijöitä. Opiskelijat käyttävät ongelmanratkaisua ja transferenssia selviytyäkseen kokemastaan stressistä (artikkeli 1). Faktorianalyysien perusteella PSS-mittari oli toimivin neljän faktorin ratkaisuna sisältäen 16 väittämää. PSS-mittarilla voidaan pätevästi ja luotettavasti mitata opiskelijoiden kokemaa stressiä kliinisessä oppimisympäristössä. Mittarin faktorit nimettiin seuraavasti: Tiedon ja kliinisten taitojen puute, Työkuorma ja kliiniset harjoitteluympäristöt, Opettajat ja hoitohenkilökunta ja potilaiden hoitaminen (Artikkeli 2). Suomalaiset ensimmäisen vuoden hoitotyön opiskelijat tunsivat vain harvoin stressiä käytännön harjoittelunsa aikana (Artikkeli 3). Toisen vuoden aikana opiskelijat kokivat jonkin verran stressiä ammatillisten tietojen ja taitojen puutteen, harjoitteluun liittyvien tehtävien ja työkuorman sekä harjoitteluympäristön vuoksi. Molempien opiskeluvuosien aikana opiskelijat selviytyivät stressistä pääasiassa tunneperäisten menetelmien, kuten transferenssin avulla. Stressin hallintakeinoissa oli havaittavissa joitakin eroja ensimmäisen ja toisen vuoden aikana (artikkeli 4).

Tutkimustulosten perusteella hoitotyön opettajia, käytännön ohjaajia ja hoitohenkilökuntaa suositellaan perehdyttämään opiskelijoita etukäteen harjoitteluihin liittyvään stressiin ja sen hallintaan. Kliinisellä oppimisympäristöillä on tärkeä merkitys opiskelijoiden oppimisessa. Hoitotyön johtajien ja päättäjien tulisikin jatkossa kiinnittää enemmän huomiota käytännön harjoitteluympäristöihin ja niiden kehittämiseen, ohjaajien koulutukseen ja ohjaukseen laatuun. Tulosten perusteella muodostettiin hoitotyön opiskelijoiden harjoittelun aikaista stressiä ja sen hallintaa määrittelevä alustava viitekehys. Jatkotutkimusta tarvitaan hoitotyön opiskelijoiden selviytymisstrategioiden ja stressin aiheuttajien yhteydestä sekä erilaisten stressinhallintakeinojen tehokkuudesta.

Avainsanat: *Stressi, Selviytymiskeinot, Hoitotyön opiskelijat, Käytännön harjoitteluympäristöt, Hoitotyön koulutus, Mittarin/instrumentin kehittäminen*

ACKNOWLEDGEMENTS

LIST OF ORIGINAL PUBLICATIONS

This dissertation is based on the following original publications:

I   Bhurtun, H, Azimirad, M, Saaranen, T & Turunen, H. Stress and Coping
     Among Nursing Students During Clinical Training: An Integrative Review.
     The Journal of Nursing Education, 58(5), 266–272.
     https://doi.org/10.3928/01484834-20190422-04.

II   Bhurtun H, Estola M, Saaranen T., Turunen H. The psychometric properties of
     the Perceived Stress Scale (PSS) when used to measure stress levels of Finnish
     nursing undergraduate students. Journal of Nursing Measurement (Accepted
     22.02.2020).

III Bhurtun H, Estola M, Saaranen T., Turunen H. Stress in the clinical learning
     environment – perceptions of first-year Finnish nursing students. Nursing
     Education Perspectives, Publish Ahead of Print.
     https://doi.org/10.1097/01.NEP.0000000000000693

IV   Bhurtun, H., Turunen, H., Estola, M., Saaranen, T. Changes in stress levels and
     coping strategies among nursing students - A two-wave longitudinal study.
     Nurse Education in Practice (Submitted 09.06.2020).

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CONTENTS

ABBREVIATIONS

CBI	Coping Behaviour Inventory
CFA	Confirmatory Factor Analysis
d	Cohen d
ECTS	European Credit Transfer and Accumulation System
EFA	Exploratory Factor Analysis
GAS	General Adaptation Syndrome
M	Mean
M1	Moment 1
M2	Moment 2
PSS	Perceived Stress Scale
SD	Standard Deviations
TTSC	Transactional Theory of Stress and Coping
UAS	University of Applied Sciences
WHO	World Health Organisation

1 INTRODUCTION

In Finland, the Ministry of Education and Culture reported that 2,400 nursing students are enrolled annually in nursing education at Universities of Applied Sciences (UASs), while in recent years extra nursing students have been recruited to meet future demands on the shortage of nurses (OKM, 2014 and OKM, 2019). The training of one student nurse was expensive and cost the Finnish government around 30,000 euros in 2014 (Ministry of Education and Culture financial report, 2015). Among Finnish UASs´ students, an increasing number (33%) reported experiencing stress and burnouts (Kunttu, Pesonen & Saari, 2016). In 2016, the Centre for Collegiate Mental Health's in the United States reported that 45% of tertiary level students sought counselling because of study stress using data from 150,483 students across 139 college and university council centres (CCMH, 2016). Further, a literature review conducted by Turner & McCarthy (2016) reported that nursing students tend to experience stress and anxiety because often, they must balance demanding clinical training with other stresses including financial, family and life issues.

The clinical learning environment is a critical platform for student nurses to gain essential clinical competences (Admi, 2018; Grant-Smith, 2019; Labrague, 2018; Suen, Lim, Wang, & Kowitlawakul, 2016). Stressors in nursing education have been recognised by several studies to impact students negatively and can possibly deter students from continuing a nursing career (Deary, Watson, & Hogston, 2003; Peterson-Graziose, Bryer, & Nikolaidou, 2013; Pryjmachuk, Easton, & Littlewood, 2009; Ranjbar, 2016; Smith & Yang, 2017). Finland is facing a severe shortage of nurses in many places (Pitkänen, Vartiainen, & Koskela, 2018), partly due to an ageing population (THL, 2020).

Although several factors affect attrition in nursing education, negative and frustrating clinical experiences were significant contributors (Hamshire, Willgoss, & Wibberley, 2012; Ten Hoeve, Castelein, Jansen, & Roodbol, 2017). The attrition rate in Finnish nursing education was at 5.1 % for the academic year 2016/2017 (Statistics Finland, 2020). Consequently, students who leave the programme perpetuate to this shortage. Furthermore, in nursing sector Finnish nurses' mean age in 2018 was 43 years (THL, 2018) and the European Union estimated a lack of up to 1,000,000 healthcare professionals by 2020 in the European Union countries, which will negatively affect both the public and private health sector (European Commission, 2012). In Finland, a critical shortage of nurses is predicted, starting in 2025 (Ensio, Lammintakanen, Härkönen, & Kinnunen, 2019).

In Finland, several measures were implemented to guarantee the quality of the social and health care services including additional funding in the year 2014 – 2015 for intaking an extra 1493 nursing students on top of the usual 2400 nursing student's intake (OKM, 2014; Eriksson et al., 2015). Recently, again an investment of five million euros to create a further 180 new nursing study places in 2020 was announced (Ministry of Education and Culture announcement, 2019). Furthermore, Finland

imported nurses from Spain and the Philippines. However, this solution has been problematic because foreign nurses faced several challenges in Finland due to language barriers (Ensio et al., 2019), challenges in recognition of qualifications that resulted to being undervalued and made to work as health carers (Pitkänen et al., 2018), and facing continuous discrimination at work (Koivuniemi 2012).

Several empirical studies concluded that nursing students suffer significant stress in the clinical learning environment (Gurková, E. & Zeleníková, 2018; Labrague, 2013; Sheu, Lin, & Hwang, 2002; Valero-Chillerón, 2019; Waled A.M. Ahmed & Badria M.A. Mohammed, 2019). While some stress is necessary and can be productive, a prolonged period of stress may negatively impact nursing students' well-being and health, leading to diseases and burnout (Chan, So, & Fong, 2009; Gibbons, 2010; Valero-Chillerón, 2019). Student nurses often report "taking care of patients", "lack of knowledge and skills", and "assignments and workload" as major stressors in the clinical learning environment (Al-Gamal, Alhosain, & Alsunaye, 2018; Gurková, Elena & Zeleníková, 2018; Labrague, 2018; Labrague et al., 2018).

Nursing students described coping with stressors by employing coping strategies including transference, avoidance, and problem-solving (Alzayyat & Al-Gamal, 2016; Gurková, Elena & Zeleníková, 2018; Sheu et al., 2002). Nursing lecturers and preceptors need to have a clear understanding of clinical stressors to support their nursing students effectively in choosing proper coping strategies. These coping strategies will not only alleviate stress levels among students but will also promote a learning-friendly supportive clinical environment (Admi, 2018; Beanlands, 2019; Enns, 2018; Fornes - Vives, 2016).

Research on stress and coping strategies have mostly been conducted in eastern European countries (Labrague et al., 2016) and evidence on stress and coping in the Finnish context are limited to international students in the nursing programme and not their Finnish counterparts (Wang, Karki & Cheng, 2014). Additionally, because most studies used cross-sectional data, limited knowledge exists on the evolving nature of stress (Al-Gamal, Alhosain, & Alsunaye, 2018; Labrague et al., 2016; Shaban, Khater, & Akhu-Zaheya, 2012).

Finnish UASs provide Bachelor of Healthcare level nursing education and other nursing-related qualifications in fields such as public health nurse, midwifery and paramedic-nurse (Finnish National Agency for Education, 2010). These UASs were formerly known as polytechnics (Hafsteinsdóttir et al., 2019). Henceforth, to refer to Universities of Applied Sciences, the term UASs will be used. At present, there are 25 UASs in Finland (Study.EU, 2020).

Except for the Police UAS, most other UASs offer a Bachelor of Healthcare level nursing education. Nursing education lasts 3.5 years in Finland (Finland Ministry of Education and Culture, 2006) by following the EU council directive and regulation. The nursing education consists of both theoretical and clinical practice. Several European commission directives (77/452/ETY, 77/453/ETY, 89/595/ETY, 2001/19/EY, and 2005/36/EY) and the Finnish polytechnics legislation (Decree on Polytechnics

352/2003 and the Polytechnics Act 351/2003) regulate the nursing degree programme in Finland.

The government of Finland authorises UASs to determine their educational mission, educational fields they can offer, and the number of students' intakes each semester. Most UASs offer two student intakes per year, and while nursing education is offered mainly full-time, an adult education pathway also exists that allows students to complete the same education on a part-time basis. Following the Finnish polytechnics legislation, UASs prepare their curriculum independently, which includes the compulsory studies, professional studies, elective studies, clinical training, thesis, and assessment methods (Eriksson et al. 2015).

In the European education, the European Credit Transfer System (ECTS) is used to explain the number of hours in a curriculum. Two hundred and ten ECTS are needed to complete the bachelor's degree requirements of nursing with one ECTS equalling 27 hours of student's work. The clinical period is 75 ECTS in total and is conducted in a clinical learning environment outside the institution's own. During each semester students have one clinical period, which usually lasts 6-7 weeks, except for the last semester's clinical training that is between 10-14 weeks. Students are required to undergo clinical training in the following fields: nursing homes and health care centres (first year); medical, surgical, internal medicine, emergency care, intensive care and mental health (second year); home nursing, geriatrics, gynaecology and other specialist wards (third and fourth year). The requirements and levels of difficulty increase every semester; the evaluation criteria and passing the clinical training is stricter every year; as such, the levels and sources of stress may vary over study years. Furthermore, nursing students are assigned a clinical mentor who must be a registered nurse (Finland Ministry of Education and Culture, 2006) and a supervising lecturer from the student's UAS. However, as from 2021, the National Examination of Nurses (180 ECTS) has been proposed. This reform will ensure a national curriculum and assessment, which will be introduced gradually through the YleSHarvionti project in all UAS in Finland (Eriksson et al. 2015).

As mentioned earlier, since UASs independently formulate their curriculum, the clinical placements offered each semester varies in accordance with the curricula of each UAS. However, according to the educational legislation in Finland (Decree on Polytechnics 352/2003 and the Polytechnics Act 351/2003) and the Rectors' Conference of the Finnish Universities of Applied Sciences, nursing students should demonstrate competences in the following fields after successful completion of the degree: "psycho-social support of a patient, procedures and diagnostic tests, nursing interventions, infection control, pharmacological treatment, anatomy and physiology, pathophysiology, nutrition therapy, medical nursing, surgical nursing, child, young people and family nursing care, maternity care, mental health and substance abuse care, gerontological care and home care, acute care, palliative care and end of life and disability and care for disabled people" (Eriksson et al. 2015, p63).

In Finnish nursing education, since the beginning of nursing science as an academic discipline, the clinical learning environment has been the interest of several

studies (see for example Hentinen, 1989., Saarikoski & Leino-Kilpi, 1979., Papp, Markkanen & Bonsdorff, 2003., Jokelainen et al. 2011, 2013). Finnish student nurses orientation to nursing has been documented to be a complex phenomenon; while students may have different orientations to why they commit to a nursing career, raising the personal orientation's of nursing students may promote motivation to continue nursing studies and a career in nursing (Vanhanen, Hentinen, & Janhonen, 1999; Vanhanen & Janhonen, 2000; Vanhanen-Nuutinen, Janhonen, Maunu, & Laukkala, 2012). More recent studies addressing nursing students in Finland have focused mainly on examining student's views on assessment in their final clinical training (Helminen, Tossavainen, & Turunen, 2014; Helminen, Johnson, Isoaho, Turunen, & Tossavainen, 2017) and exploring the process of transitioning from a student nurse to a registered nurse (Kaihlanen, Lakanmaa, & Salminen, 2013; Kaihlanen, Salminen, Flinkman, & Haavisto, 2019; Kaihlanen, Elovainio, Haavisto, Salminen, & Sinervo, 2020). Furthermore, it has been recommended that more research is needed in Finland in nursing education (Vierula, Stolt, Salminen, Leino-Kilpi, & Tuomi, 2016). There is a lack of knowledge, specifically focusing on stress and coping in Finnish nursing education. Therefore, this present study explores stress and coping strategies among Finnish undergraduate nursing students in their first two years of the nursing programme.

2 LITERATURE REVIEW

2.1 MAIN CONCEPTS OF THE STUDY

The main concepts of the study are *stress, coping, nursing student and clinical learning environment*, and these will be described and defined in this chapter. The concept of stress in behavioural context was introduced in 1936 by Austrian-born Hungarian scientist Hans Selye, who defined it as "the non-specific response of the body to any demand for change" (Selye, 1965 p. 97-99). Further, he explained that a proper definition of stress should include good stress (also recognised as eustress), and bad stress (also recognised as distress). Following his definition, many studies investigated deeper in the subject to examine stress more closely resulting in several descriptions of stress, thus causing uncertainty around the word itself (Friedman, 2011). After much confusion, Selye (1980) mentioned: "Stress, like Einstein's theory of relativity, is a scientific concept which has suffered from the mixed blessing of being too well known and too little understood" (p. 22-27).

Another widely used definition of stress is Lazarus and Folkman's (1984) stress theory, in which stress is defined as "a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p. 13). This definition relates to a person's evaluation of circumstances in which the person judges whether a situation is threatening, harmful or challenging, thus causing impediments to the person's desired goals (Friedman, 2011; Lovallo & Lovallo, 2005).

The World Health Organization (WHO) defines work-related stress as "the response people may have when presented with work demands and pressures that are not matched to their knowledge and abilities and which challenge their ability to cope" (WHO, 2019). Hobfoll (1989) explained that stress is related to the resources that a person wishes to protect, defend and conserve. These resources can include anything that the person values, including physical property, relationship and personal qualities. Pollock (1984) described stress as a physiological and psychological phenomenon while the American Psychiatric Association (2014) defined stress as "as a sense of being overwhelmed, worry, destruction, press, exhaustion, and lethargy. Therefore, stress can influence people in every age, sex, race, and situation and can result in both physical and psychological health" (p 12).

Numerous additional definitions of stress exist; nevertheless, there is no complete agreement of the concept of stress (Friedman, 2011). Considering the previous definitions of stress, in this study, *stress* is defined as the overwhelming situation the nursing student perceives in the clinical learning environment.

Coping as a concept, although originating from Sigmund Freud psychodynamic work on defences (Freud, 1894) is more widely known from the stress and coping theory of Lazarus and Folkman (1984). The authors suggested that coping can be defined either by the automatic or planful manner to deal with a threatening, harmful

or challenging situation. It is achieved by either using problem-focused coping that diminishes the impact of the stressor (a situation that is causing the stress) or using emotion-focused coping that focuses on reducing the distress emotions caused by stress.

Aspinwall and Taylor (1997) defined coping as "activities undertaken to master, tolerate, reduce, or minimize environmental or intra-psychic demands perceived to represent potential threats, existing harm, or losses" (p. 417). Recently, additional definitions of coping have been suggested (Leventhal, Brisette, & Leventhal, 2003 and Morling & Evered, 2006), however, to some extent they can be placed under Lazarus and Folkman (1984) concept of problem-focused and emotion-focused coping. Another interesting definition of coping is "an attempt to overcome difficulties on equal terms; it is an encounter wherein people reach out and within themselves, for resources to come to terms with difficulties" (Haan, 1993, p. 260). In the nursing context, the conceptual framework that is widely used to investigate stress and coping strategies among nursing students has been the Lazarus and Folkman (1984) stress theory. In this study, *coping* is defined as the reaction to the overwhelming situation the nursing student perceives in the clinical learning environment.

According to the dictionary definition, a nursing student is someone learning or training to become a nurse (Collins, 2020). In the context of nursing education in Finland, a Finnish student nurse means a student studying a nursing programme leading to a bachelor's degree in nursing. Nursing students in Finland are awarded a Bachelor of Healthcare degree after successful completion of the nursing programme. Additionally, after graduation, Bachelor of Healthcare graduates need to register with the National Supervisory Authority for Welfare and Health to be able to use the title of a registered nurse (Valvira, 2020). In the context of this study, a *nursing student* means a person who is enrolled in a UAS as a student and is learning or training to become a nurse that is leading to a degree programme in nursing.

The clinical learning environment is a broader concept that encompasses educational and learning activities in clinical settings (Papastavrou, Dimitriadou, Tsangari, & Andreou, 2016). The term "clinical" refers to "medical work or teaching that relates to the examination and treatment of ill people" while "setting" implies "the time and the place in which the action of a book, film, play, etc. happens" (Cambridge Dictionary Online, 2020). According to the European Union Directive (2013/55/EU), nursing education consists of theoretical and clinical training. The European Union Directive (2013/55/EU: L354/151) further outlines that nursing student in the clinical training "as part of nurse training in which trainee nurses learn, as part of a team and in direct contact with a healthy or sick individual and/or community, to organise, dispense and evaluate the required comprehensive nursing care, on the basis of the knowledge, skills and competences which they have acquired". Consequently, in this study, the *clinical learning environment* refers to the clinical settings that cover all nursing student's learning.

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2.2   LITERATURE SEARCH AND REVIEW

A literature search was conducted to find the latest publications on the topics of stress, coping, nursing students and the clinical learning environment. Several databases were searched including CINAHL® (Cumulative Index to Nursing and Allied Health Literature); MEDLINE® (Medical Literature On-Line); PsycINFO® (Psychology Information); SCOPUS®; and ERIC® (Institute of Educational Sciences).

The search strategy (see Appendix 1), the inclusion criteria (see Appendix 2) and the progression of the review (see Appendix 3) have been included in the appendices.

Since a previous integrative review has already been conducted as part of this thesis (see Article I), this updated review did not include the publications published in Article I.

A total of 1143 non-duplicate original publications were identified. After the removal of the original publications that were irrelevant based on the title, abstracts and full-text content, 18 original publications were identified and presented in a table format (see Appendix 4). The table has been designed to highlight the conceptual framework, aims, research design and main results of the 18 studies that have been included, and they have been presented in the subsequent chapters.

2.3   CONCEPTUAL FRAMEWORKS OF STRESS AND COPING

Several conceptual frameworks on stress and coping exist. In this part, the literature focuses on the three most used stress and coping frameworks that have been discussed in previous literature on stress among nursing students. Cognitive-transactional, stimulus-based and response-based perspectives are the three main approaches used in stress literature. The cognitive-transactional concept of stress was introduced by Lazarus and Folkman (1984) during the development of the transactional theory of stress and coping (TTSC). The stimulus-based perceptive is based on the research of Holmes and Rahe (1967), while the response-based perspective of stress is founded upon the works of Selye (1980). The Holmes and Rahe (1967) stress scale bases on 43 questions of stress-causing life events that may cause illness when faced. Selye (1980) introduced the concept of coping with adapting to stress-causing situations.

While Lazarus and Folkman's (1984) three meta-theoretical assumptions of TTSC are transaction, process, and context, Holmes and Rahe (1967) ignores the biological, cognitive and emotional factors related to the individual concerning stress. Further, Holmes and Rahe (1967) classified stress-causing situations and their intensity to examine the limit to which the person can cope, beyond which stress is perceived. The importance of the stress-causing situation and its intensity is critical to consider according to the author in understanding stress and its negative influence on a person's health. Contrarily, Selye (1980) explained that stress is based on the response of the person in relation to the environment. This conceptual framework is dominant in medical studies and highlights the distinction between the stressor (stimulus) and

the stress (response). This stress response followed the General Adaptation Syndrome (GAS) that includes the alarm reaction (fight or flight response), a resistance stage (body adapts to the new situation), and exhaustion stage (body has depleted resources while repairing itself).

Lazarus and Folkman (1984) assumed that stress arises after a person experiences a situation that exceeds his or her abilities to manage the stress-causing situation. Specifically, stress is perceived through the person's appraisal of the stress-causing situation, rather than the objective situation. A threat, harm, or challenge are perceptions that the individual can experience in the initial stress-causing situation. All these perceptions are undesirable conditions that are not normal, thus causing stress. Partly in line with Lazarus and Folkman's (1984) TTSC, Selye (1980) acknowledged that stress response is a perceived emotion and there are distinctions in the way people can perceive stress and react to it. Since stress response could be the product of either positive or negative outcomes, Selye (1980) used the term eustress (positive stress) to explain good stress such as winning the lottery (Friedman, 2011) and the term distress (negative stress) to explain bad stress, such as stress arising from the loss of a something of value (Friedman, 2011).

Contrarily, Holmes and Rahe (1967) classified stress-causing situations and their intensity to examine the limit to which the person can cope, beyond which stress is perceived. The authors developed the Holmes and Rahe Stress Scale to study whether stress contributes to illness. Each item in the scale corresponds to a different amount of points, and all items added together reveals the number of points a person has, which in turn can be used to forecast illness in the individual. In line with Holmes and Rahe (1967) and Selye (1980) stress frameworks, Lazarus and Folkman's (1984) framework focuses on the stress-causing situation that is perceived by the individual, and the relationship that develops between the person and the situation or the environment where the stress-causing situation is. Simply, the person feels stressed when he or she feels that things are out of control. Additionally, the authors considered stress as ever-changing, which is an active and progressive process that is derived from the stress-causing situation (Friedman, 2011; Lovallo & Lovallo, 2005).

The widely used conceptual frameworks of coping in nursing education context include problem-focused and emotion-focused coping, and engagement versus disengagement or avoidance coping. Problem-focused and emotion-focused coping results from the works of Lazarus and Folkman (1984). While problem-focus coping targets the stress-causing situation itself by taking logical steps to remove the threat or harm; emotion-focus coping aims at dealing with distress emotions caused by stress-causing situations. Furthermore, Lazarus and Folkman (1984) emphasised that while problem-focused and emotion-focused coping are distinct coping strategies, they can have interrelated effects on one another. Contrarily, engagement coping encompasses all forms of problem-focus coping and some aspects of emotion-focus coping, including seeking emotional support and acceptance. Disengagement coping is an emotion-focus coping involving the use of avoidance, denying stressful

situations and optimistic thinking. Avoidance coping is an ineffective coping strategy since the person escapes the stress-causing situation temporarily. However, in the long-run, the stressor is still present, and there may be less time to deal with the stress the more avoidance coping is used (Friedman, 2011).

Lazarus and Folkman (1984) argued that using effective problem-focused coping to solve problems can result in finding proper solutions to the problem and solve it. Consequently, the distress emotions caused by the initial problem is limited. Therefore, emotion disturbances can be significantly reduced and prevented by using effective problem-focused coping. Likewise, using effective emotion-focused coping the person can concentrate better on the stress-causing situation, allowing the person to use problem-focused coping more effectively and calmly. Accordingly, the person can discover new effective problem-focused responses that were not obvious before. Hence, the use of emotion-focused coping can increase the better use of problem-focused coping. In line with the Lazarus and Folkman (1984) TTSC, other concepts of coping include locus of control (Rotter, 1966) and stress-related growth (Scheier & Carver, 1985) emerged; however, both concepts contains the core elements of Lazarus and Folkman's (1984) stress theory. Figure 1 presents the three perspectives of stress and coping strategies based on previous literature.

Selye's (1980) perspective	Holmes, & Rahe's (1967) perspective	Lazarus, & Folkman's (1984) perspective
• Response-based perspective • General Adaptation Syndrome (GAS) • Stage 1: Alarm • Stage 2: Resistance • Stage 3: Exhaustion • Coping by balancing between biological, psychological, and social process	• Stimulus-based perspective • How imortant is the stressor classification • Intensity of stressor • "weight" of stress - Life Change unit	• Cognitive-transactional based process perspective • Threatening tendency of the stress • Primary and seconday appraisal to minimize, tolerate or eradicate the stressor

Figure 1. Perspectives of stress and coping strategies

2.4 STRESS AND COPING AMONG NURSING STUDENTS IN THE CLINICAL LEARNING ENVIRONMENT

2.4.1 Stress in the clinical learning environment

Several recent studies have revealed that the clinical learning environment is a significant stressful component among nursing students (Gurková, E. & Zeleníková,

2018; Labrague et al., 2018; Wolf, 2015). In limited amount and acting as a positive phenomenon, stress can be beneficial to nursing students because it can act as a challenge, promote learning and competition. However, in excessive amounts and when experienced for a prolonged period, stress can negatively affect health, decrease study success and lead to depression (Gibbons, 2010; Labrague, 2013).

In the last decades, a large body of studies has been conducted investigating stress and coping strategies among nursing students in the clinical learning environment (Alzayyat & Al-Gamal, 2014b; Bhurtun, Azimirad, Saaranen, & Turunen, 2019; Labrague et al., 2016). However, evidence on the dynamic and evolving nature of stress is limited because most studies used a cross-sectional design and measured stress at one point only. Recently, literature reviews have recommended the use of longitudinal studies to understand the complex nature of stress as it develops (Fornés-Vives, Garcia-Banda, Frias-Navarro, & Rosales-Viladrich, 2016; Jimenez, 2010; Lo, 2002; Zupiria Gorostidi et al., 2007). Furthermore, these reviews reported that most studies had collected data from Asian and Middle Eastern countries only (Alzayyat & Al-Gamal, 2014b; Labrague et al., 2016; Pulido-Martos, Augusto-Landa, & Lopez-Zafra, 2012).

Investigating stress among nursing students can be complicated because of several reasons. First, evidence from recent studies suggested that nursing students encounter several stressful events in the clinical learning environment (clinical stressors) and employ different coping strategies to alleviate them (Gurková, Elena & Zeleníková, 2018; Karaca, Yildirim, Ankarali, Acikgoz, & Akkus, 2017; Rafati, Nouhi, Sabzevari, & Nahid Dehghan-Nayeri, 2017). Second, numerous studies revealed varying stress levels among nursing students' cohorts at different phases (first, second year and third year) of their studies (Deary, Watson, & Hogston, 2003; Sandhya Ghai, Monika Dutta, & Aarti Garg, 2014; Zupiria Gorostidi et al., 2007). Third, study designs, settings, and stress and coping measuring instruments varied, posing a challenge to compare stress levels among different studies (Alzayyat & Al-Gamal, 2014b; Bahadır-Yılmaz, 2016). Fourth, extrapolating the results of stress study should be done cautiously because stress is a perceived phenomenon and as suggested by Lazarus and Folkman (1984) stress is perceived through the person's appraisal of the stress-causing situation, rather than the objective situation.

Clinical stressors perceived by nursing students that have been widely reported include "stress from taking care of patients", "stress from assignments and workload", "stress from lack of professional knowledge and skills", "stress from the environment", "stress from peers and daily life", and "stress from teachers and nursing staff" (Gurková, Elena & Zeleníková, 2018; Labrague et al., 2016; Sheu et al., 2002). Additional clinical stressors frequently reported include "lack of nursing competence", "lack of control in relationships with patients", and "care of the dying patients" (He, Lopez, & Leigh, 2012; Liu, Gu, Wong, Luo, & Chan, 2015; Reeve, 2012).

According to two previous literature reviews identified, several quantitative studies investigating stress and coping strategies utilised the Perceived Stress Scale (PSS) and Coping Behaviour Inventory (CBI) to measure stress and coping strategies

respectively (Labrague et al., 2016; Pulido-Martos et al., 2012). However, other instruments that measure stress and coping strategies have been reported too (see Appendix 4).

Recent studies showed that first-year students reported significantly lower levels of perceived stress as compared to experienced nursing students that were conducting their final clinical training (Gurková & Zeleníková, 2018; Suen, Lim, Wang, & Kowitlawakul, 2016). Other current empirical evidence suggested that first-year nursing students perceived moderate to high levels of stress (Bahadır-Yılmaz, 2016; Bodys-Cupak, Majda, Skowron, Zalewska-Puchala, & Trzcinska, 2018).

In Bodys-Cupak's (2018) study, first-year nursing students felt that discrepancy between theory and practice and inadequate professional knowledge and clinical skills were two significant clinical stressors whereas according to Bahadır-Yılmaz (2016) "being criticized by teachers in the clinical placement" and "encountering a dying patient" were major clinical stressors among first-year students. Similarly, several studies found out that as compared to first-year students, experienced second and third-year ones tended to perceive lower levels of stress (Tully, 2004; Zupiria Gorostidi et al., 2007). However, Kelly (2004) published contrary results showing that third-year students experience high levels of stress alongside with Lo's (2002) study, which also revealed high levels of stress among second-year nursing students.

Karaca et al. (2017) revealed an average stress score of 2.37 (SD = 0.84) among 876 Turkish undergraduate nursing students. Furthermore, Khater et al. (2014) and Jimenez et al. (2010) reported mean stress scores of 1.56 (SD = 0.63) and 1.87 (SD = 0.64) among 286 baccalaureate nursing students in Jordan and 357 Spanish nursing students at various points in their studies, respectively. Both Karaca et al. (2017) and Khater et al. (2014) identified "stress from assignments and workload" to be a significant stressor – reporting mean stress scores of 2.54 (SD = 0.96) and 2.12 (SD = 0.88), respectively – while the study from Jimenez et al. (2010) revealed "stress from taking care of patients" to be the most significant stressor in the clinical learning environment. The sub-dimension of "stress from a lack of professional knowledge" and skill received the lowest scores in both Karaca et al. (2017) and Khater et al. (2014), more specifically, 2.12 (SD = 1.19) and 1.29 (SD = 0.94), respectively. Jimenez et al. (2010) reported "stress from peers and daily life" – which received a score of 1.60 (SD = 1.22) - to be the least stressful factor for students.

2.4.2   Coping in the clinical learning environment

Several studies published coping strategies that nursing students often use including staying optimistic, transference, avoidance, and problem-solving (Alzayyat & Al-Gamal, 2014b; Gurková, E. & Zeleníková, 2018; Sheu et al., 2002). These coping strategies are often classified under either problem-focused coping or emotion-focused coping, according to Lazarus and Folkman (1984).

However, Carver, Scheier, and Weintraub, (1989) argued that the distinction between problem-focused coping or emotion-focused coping is too simple given that

emotion-focused coping strategies are different in nature and encompasses transference, avoidance, escape, denying being stressful and seeking emotional support. Two studies conducted in America that employed mixed-method designs recognised fear of failure in clinical learning environment and time management problems (Wolf, 2015) as main stressors while talking to friends, ignoring their stress, and crying as main coping strategies (Reeve, 2012).

In numerous studies, nursing students reported using problem-focused coping strategies including staying optimistic, setting up objectives to solve problems, and employing past experiences to solve problems that arise from the clinical learning environment (Akhu-Zaheya et al., 2015; Fornes - Vives, 2016; Gibbons, 2010). Further, while some studies revealed that first-year students tend to use emotion-focused coping as compared to second and third-year nursing students, others published contrary results (Gibbons, 2010; Tully, 2004). Numerous authors also argued that the use of coping could be related to factors such as participants socio-demographical characteristics and cultural context (Alzayyat & Al-Gamal, 2016; Labrague, 2013; Pulido-Martos et al., 2012).

Emotion-focused coping strategies include escape-avoidance, transference such as "watching television", "feasting and sleeping longer", and "avoiding difficulties that arise from the clinical learning environment" (Sheu et al., 2002). Few empirical studies also highlighted that problem-focused coping strategies are more effective, rather than emotion-focused coping. It is so because problem-focused coping strategies alleviate, reduce and eliminate clinical stressors whereas emotion-focused coping such as escape-avoidance and feasting suppress the distress emotions caused by these clinical stressors; however, the clinical stressors still exist (Gibbons, 2010; Kim, 2003; Tully, 2004).

As previously mentioned, while different instruments exist to investigate nursing students' coping strategies in the clinical learning environment (see Appendix 4), CBI is a widely used tool (Alzayyat & Al-Gamal, 2016; Labrague, 2013; Pulido-Martos et al., 2012). For example, Bahdir-Yilmaz (2016) utilised the Nursing Education Stress scale and Ways of Coping Inventory to examine stress and coping respectively among 109 Turkish nursing students in a cross-sectional study, while Blomberg (2014) utilised a numerical rating scale that was specifically developed to measure stress among 184 final year Swedish nursing students.

2.5   SUMMARY OF THE LITERATURE REVIEW

This chapter summaries prior knowledge on the conceptual perspective and earlier literature on stress and coping of student nurses in the clinical learning environment. The widely used definition of stress present stress as the relationship between the person and the surrounding environment (Lazarus & Folkman, 1984). The appraisal of stress is seen as a threatening, challenging and harmful relationship,

which needs to be resolved to maintain well-being. Coping in the context of stress either reduces, alleviates, and diminish stress, or use of other emotion focused-coping strategies to escape distressing emotions. Lazarus and Folkman (1984) stress theory is widely used as the guiding concept in studies related to nursing students' stress and coping.

There is conflicting evidence on the sources, levels of stress and coping strategies that nursing students employ in their clinical learning environment during their studies (Gurková, E. & Zeleníková, 2018; Labrague et al., 2016). Further, most studies that researched stress and coping used cross-sectional data (Alzayyat & Al-Gamal, 2016; Labrague, 2013; Pulido-Martos et al., 2012). This can be problematic in understanding stress because of its evolving nature (Zupiria Gorostidi et al., 2007). Two systematic reviews that were identified endorse future studies to employ a longitudinal design to examine the evolution of stress within the same cohort (Alzayyat & Al-Gamal, 2014b; Labrague et al., 2016). The PSS and CBI are two instruments that have been widely used in quantifying stress and coping respectively (Labrague et al., 2016). Finally, because of distinctions in the clinical nursing curriculum among different countries and cultural contexts, stress sources, levels and coping strategies vary across countries (Burnard, 2007; Gurková, E. & Zeleníková, 2018; Labrague et al., 2016).

The present study focuses on examining changes in stress levels and coping strategies among undergraduate student nurses doing their degree programme in nursing in Finland. Stress is an important topic to explore because prolonged stress has been linked to poor study success and diseases (Admi, 2018; Grant-Smith, 2019; Suarez-Garcia, 2018). Better understanding stress and coping are necessary for evidence-based curriculum development, and the influence that the clinical learning environment poses on nursing students' learning can be considered by healthcare managers and policymakers to advance the clinical learning environment. Figure 2 illustrates the concepts of this study, their relationships with each other and how it has been understood based on the literature review. Based on the TTSC model of Lazarus and Folkman (1984), stress and coping theory in the clinical learning environment were viewed such that coping is a response to the stress nursing students perceived in the clinical learning environment.
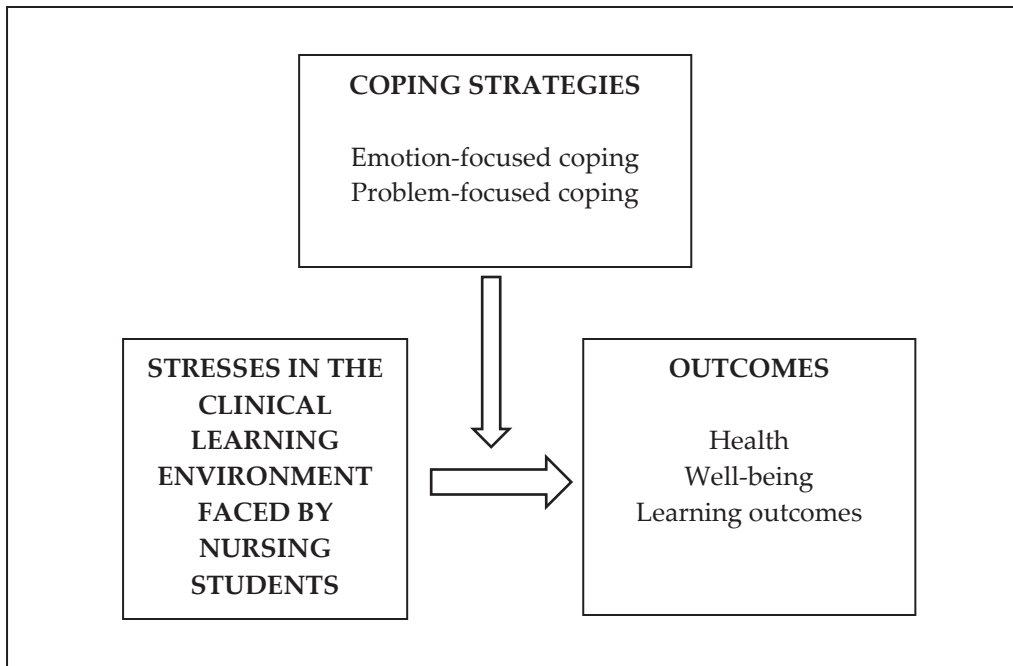
Figure 2. Transactional model of stress and coping in the clinical learning environment in nursing education (based on Lazarus and Folkman, 1984)

3 AIMS OF THE STUDY

The purpose of this thesis was to describe and explain the self-rated stress levels, stressors, and coping strategies that undergraduate bachelor's level nursing students employ in the clinical learning environment within the Finnish context. Also, the purpose was to evaluate an international stress scale and develop it further to measure Finnish nursing students' stress.

Thus, this study is divided into two sub-studies: sub-study I and sub-study II
Sub-study I:
The specific research question for sub-study I:
1. To examine and describe previous literature on stress and coping strategies among nursing students in the clinical learning environment (Article I)
Sub-study II investigated the following topics:
1. To evaluate an international stress scale and develop it further to measure Finnish nursing students' stress.   (Article II)
2. To investigate stress and coping strategies among undergraduate first-year nursing students in the clinical learning environment (Article III)
3. To explore changes in stress levels and coping strategies from first to the second year of study among undergraduate nursing students in the clinical learning environment? (Article IV)

4 DESIGN

Figure 3 presents the design, sample, participants, data collection methods and analysis methods of the studies.

Nursing students' stress and coping in the clinical learning environment

Sub-study – Article I

Aim: To examine and describe previous literature on stress and coping strategies among nursing students in the clinical learning environment

Design: An integrative literature review guided by Whittemore and Knafl's (2005) approach and employing a narrative conceptual synthesis method

Methods: A literature search using the CINAHL, MEDLINE, PsycINFO, SCOPUS, and ERIC databases, with 13 papers included

Article IV

Aim: To explore changes in stress levels and coping strategies

Design: Two-wave longitudinal study

Data: 131 nursing students contributed data on at least two occasions using self-completing questionnaires

Methods: Descriptive statistics and paired sample t-tests used to measure changes over time.

Sub-study II – Articles II-IV

Article III

Aim: To investigate stress and coping strategies

Design: Cross-sectional, descriptive study

Data: 189 participants first-year undergraduate nursing students contributed data using self-completing questionnaires

Methods: T-tests and Pearson correlation analyses were performed

Article II

Aim: to evaluate the Perceived Stress Scale (PSS) and develop it further to measure Finnish nursing students' stress

Design: Cross-sectional, descriptive study

Methods: Using data from (n = 189) participants and conducting Exploratory Factor Analyses and Confirmatory Factor Analyses

Figure 3. Design, sample, participants, data collection and analysis methods of the study

4.1 SUB-STUDY I (ARTICLE I): STUDY DESIGN, DATA AND ANALYSIS

Sub-study I (Article I) was an integrative literature review and aimed to identify (1) the settings, designs, sample sizes and instruments, (2) levels and sources of stress and (3) coping strategies in studies that investigated stress and coping among undergraduate nursing students during their clinical education.

An integrative literature review following the guidelines of Whittemore and Knafl's (2005) approach and employing a narrative, conceptual synthesis method was conducted to examine evidence on stress and coping among nursing students in their clinical learning environment. The search strategy generated 1170 records from five different databases. After the duplicated records were removed, there were 953 records left. These were screened by title, abstract and full-text assessment, after which 27 records were left. Two scholars including the primary author further screened the 27 studies using the critical appraisal tool developed by Hawker et al. (2002), resulting in 13 studies included in the integrative literature review (see Appendix 5).

The integrative literature review was based on the preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement (Moher et al., 2015). Altogether, five databases were searched with the library information specialist. They included: (1) CINAHL (Cumulative Index to Nursing and Allied Health Lite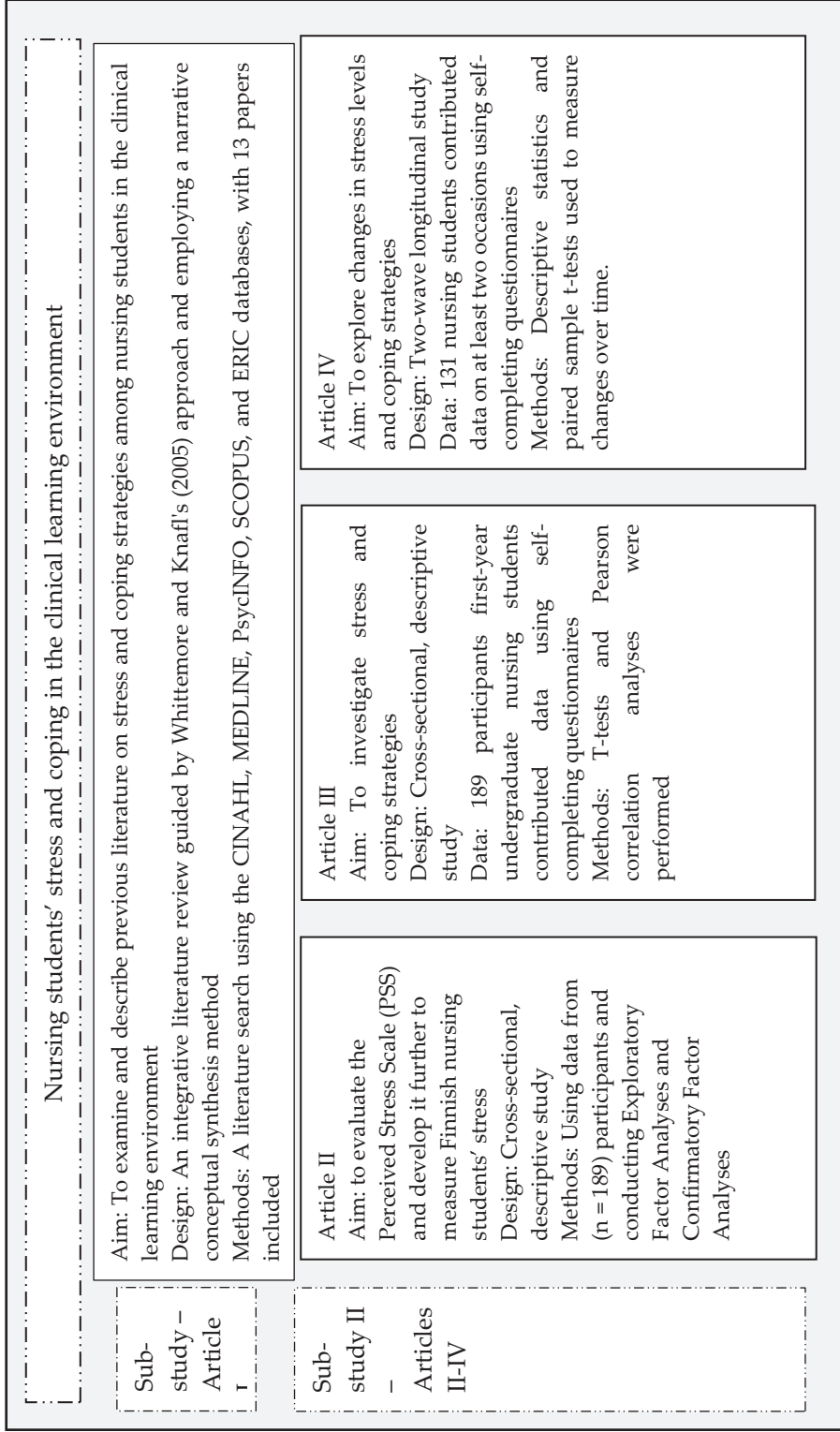rature); (2) MEDLINE (Medical Literature on-Line); (3) PsycINFO (Psychology Information); (4) SCOPUS; and (5) ERIC (Institute of Educational Sciences). The justification for selecting these databases have been explained in Article I. (see Article I)

Test searches were performed with search terms to evaluate the range of the publications. After that, planning of search terms was done carefully according to the library information specialist advice, and thus, the limitation of unrepresentative search results was minimized. Search terms included "stress" (corresponding words such as "eustress" and "distress"), "coping mechanisms" (corresponding words such as "cope", "coping", "coping strategy", "responses to stress", "coping techniques"), "nursing students" (corresponding words such as "student nurse", "undergraduate nursing student" and "trainee nurse") and "clinical practice" (corresponding words such as "internship" and "clinical education") in various combination.

The inclusion criteria were (1) studies published between 2007 and March 2017; (2) peer-reviewed publication; (3) English language publications; (4) content that related to "undergraduate nursing student stress and coping mechanisms in clinical education, or clinical internship that is part of their bachelor nursing degree/degree in health care programme". The exclusion criteria were: (1) commentaries, opinions, and abstracts of conferences; (2) response papers; (3) non-English language papers. Twenty-seven studies met the criteria of this integrative review.

Two scholars independently subjected the 27 studies to a 9-item standardized appraisal tool developed by Hawker et al. (2002). Each study was appraised and

given points ranging from 1 to 4. Therefore, each study could have a maximum of 36 points and a minimum of 9 points. The mode was 29 points; therefore, original research studies that accrued more 29 points were included; consequently, 13 studies were included in this review (see Appendix 5).

All the 13 studies included in the review had a quantitative design but because of varied research methodologies, of the publications, the narrative, conceptual synthesis method was used (Khan, Kunz, Kleijnen, & Antes Gerd, 2003).

4.2   SUB-STUDY II (ARTICLES II-IV): STUDY DESIGN, INSTRUMENTS, DATA AND ANALYSIS

The first part of sub-study II (Article II) investigated the psychometric properties of the PSS when applied to nurse students in Finland. Its objective was to validate the PSS for nursing students in the cultural context of a Finnish sample. This was a psychometric study with a cross-sectional design. Since the instruments were originally in the English language, and the participants are Finns, the instruments were translated and adapted. This was done by carefully adhering to Guillemin, Bombardier, & Beaton, (1993) translation and adaptation guidelines.

In the first and second part of sub-study II (Articles II and III), first-year nursing students were recruited between May to October 2018 (Moment 1, (M1)) from five UAS. The researcher contacted each participating UAS in 2017. The study, including data collection methods, analyses of data, and presentation of results were explained, and permission to collect data was obtained from the concerned departments. Participants inclusion criteria were as follows: (1) first-year undergraduate nursing student studying at bachelor's level in the Degree programme in nursing enrolled in either spring 2018 or autumn 2018, (2) studying nursing full-time, (3) has done or is doing at least one clinical training in a clinical setting such as a hospital or nursing home during the first study year (4) studying at any of the five participating universities of applied sciences.

Altogether, the 5 UAS provided the researcher 253 nursing students details that fulfilled the inclusion criteria. All of them were contacted by email, and they were able to choose between filling both the consent form and self-reporting questionnaires (PSS and CBI) through an available sealed envelope paper version (provided by the contact person at each UAS) or online during the last week or one week after their clinical training. One hundred eighty-nine participants completed the consent form, and all the self-reporting questionnaires completely, bringing the response rate to 74,7%. The data was analyzed using Statistical Package for Social Sciences (SPSS), version 25. Outliers, normality, and missing values were checked from the raw data. The Cronbach's alpha value was interpreted to check the internal consistency of the scale. Exploratory Factor Analyisis (EFA) and Confirmatory Factor Analysis (CFA) was conduted to produce a final model of the PSS. Modification

indices to establish the "best-fitting" model to improve the fit statistics of the proposed model were consulted.

PSS consists of 29 items categorized under six factors. These six factors are: "stress from taking care of patients" (8 items); "stress from teachers and nursing personnel" (6 items); "stress from assignment and workload" (5 items); "stress from peers and daily life" (4 items); "stress from a lack of professional knowledge and skills" (3 items); and "stress from the clinical environment" (3 items) (Sheu et al., 2002). Participants evaluate the degree of stress that occurs during clinical training through a five-point Likert scale ranging from 0 to 4, with a score of 0 (or "never") indicating the absence of stress and a score of 4 (or "always") reflecting constant stress. The Cronbach's alpha coefficient for the Finnish version was 0.92.

CBI consists of 19 items categorized under the following four subscales: "avoidance" behaviour (6 items); "problem-solving" behaviour (6 items); "optimistic" coping behaviour (4 items) and "transference" behaviour (3 items). Participants evaluate the degree to which they use a certain coping strategy through a five-point Likert scale ranging from 0 to 4 (0 = never; 1= infrequently; 2 = sometimes; 3 = frequently; 4 = always) (Sheu et al., 2002). The Cronbach's alpha coefficient for the Finnish version was 0.74.

The second part of sub-study II (Article III) aimed at investigating the stress levels, sources of stress and related coping strategies used among a Finnish sample of undergraduate nursing students during their first clinical training in the eastern part of Finland. The cross-sectional study design was used. In the second part of sub-study II (article III), descriptive statistics in terms of means, standard deviations and ranges were performed for all parameters to generate a descriptive statistical analysis. Further, sum variables, correlations, independent sample t-tests, and multi-factor analysis of variance (ANOVA) were conducted.

The third part of sub-study II (Article IV) examined the changes in stress levels, and coping strategies among the same cohort studied in article III when they progressed through their second study year. The 189 participants that participated in the first data collection at M1 were contacted again. Data was collected from them again between February and May 2019 (Moment 2, (M2)) and they were now in their second study year. The same consent form and self-reporting questionnaires. One hundred thirty-one participants provided complete data at both M1 and M2. The attrition rate was 30.6%. The attrition rate could be explained because some students either left nursing or did not want to participate in the second data collection period. Henceforth, M1 refers to Moment 1, which means first data collection from the first-year students. M2 refers to Moment 2, which means the follow-up data collection of the same participants of M1 that were now in their second year.

Data were collected at M1 (i.e. the first-year nursing students) and M2 (i.e. the second-year nursing students). At M1, participants wrote their names on the questionnaires. The principal investigator assigned a unique code to each name and then removed all the names from the questionnaires and replaced them with the matching code. A file (code-file) was created that contained M1 participants name

with the corresponding code. This was kept separately from the questionnaires. At M2, participants again wrote their names on the questionnaires. The principal investigator used the code-file to identify the participants and replaced their names with the corresponding code. This file was used only to link data from M1 to M2.

In Sub-study III (Article IV) data were collected again (M2 data collection time), from the same participants that participated at M1 data collection time, and the same self-reporting questionnaires were used. The descriptive statistics, including paired sample t-tests were used to explore changes between groups, were conducted. A coding file was created linking participants names to their respective codes to identify and connect the same participants from M1 to M2. During analyses, all identifying variables were removed. This procedure was explained to the participants beforehand.

4.3 ETHICAL CONSIDERATIONS

This study followed the sound scientific principles written by the Finnish Advisory Board on Research Integrity (TENK 2012). The study was approved by the Ethical Committee of the University of Eastern Finland (3/2018) and all participating UAS (decision number 26.3.2018.62). In applied health sciences, ethical issues are important to consider. In this study, there was no patient involvement; instead, it focused on student nurses studying at UASs. Ethical issues concerning this were (1) following of the guiding principles in scientific inquiry, and (2) following the responsible conduct of researchers in nursing science and the ethical principles of nursing, including anonymity and confidentiality of the participants (Beauchamp & Childress 2009).

This study employed an objective and unbiased research methodology. Meticulousness thoughtfulness and robust research methods, and factual and in-depth reporting were examples of the guiding principles of this study. These guiding principles were followed by (1) asking research questions that allowed for the investigation of the study research questions, (2) using methods that directly explore the study research questions and connecting research to theory, (3) providing a clear, logical and natural chain of finding evidence, (4) publishing results to facilitate generalisation, and (5) reporting results to facilitate academic enquiry as well as peer-review (Chubin & Hackett 1990 and Ziman 2000).

The survey instruments used in this study to measure stress and coping strategies are internationally recognized; various studies have used them previously and reported high levels of internal consistency and validity. Permission was obtained to use both instruments from Dr Insaf Shaban, from the University of Jordan.

Further, informed consent was obtained from all participants through signing the consent form where the purpose of the study and related methodologies, including data collection, were explained. Students were informed of their right to refuse participation and withdraw from the study at any time. The same participants provided data twice; thus, the principal investigator created a code file to connect the same participant. The code file contained the participant's name and its corresponding code. This file was used only to link the first data set to the second data set. This code file was protected with a password and was saved in a secured cloud. The confidentiality of all participants was further maintained by ensuring that no name is present in the returned questionnaires and identifying all persons in the research group that may have access to the raw data. All the data, including filled questionnaires and consent forms that students had provided through the online forms, were kept in the cloud and using a password. All paper versions of filled questionnaires and consent forms were stored in a locked cabinet. During the analysis phase, all participant-identifying information (students names) were removed to preserve the anonymity of the participants, thus adhering to the European General Data Protection Regulation (GDPR, 2018). Finally, all collected

information will be stored at the research facility for ten years, after which they will be destroyed.

5 RESULTS

5.1 SUB-STUDY I: APPRAISING PREVIOUS LITERATURE ON STRESS AND COPING (ARTICLE I)

In sub-study I (Article I) nine studies had a cross-sectional design (Al-Gamal et al., 2018; Bahadır-Yılmaz, 2016; Chan et al., 2009; Gurková, E. & Zeleníková, 2018; Jimenez, Navia-Osorio, & Diaz, 2012; Liu et al., 2015; Shaban et al., 2012; Suen, Lim, Wang, & Kowitlawakul, 2016; Zhao, Lei, He, Gu, & Li, 2015), three were longitudinal (Alzayyat & Al-Gamal, 2014a; Alzayyat & Al-Gamal, 2016; Zupiria Gorostidi et al., 2007), and one was a descriptive-analytical study (Rasha & Haya, 2016).

Nearly all the publications originated from Asia and Middle Eastern countries. Most studies reported that nursing students faced moderate levels of stress from their clinical training. The primary sources of stress were found to originate from "teachers and nursing staff". Other frequent stressors that were reported in the included studies were "lack of knowledge and skills", "fear of making mistakes", and "heavy workload". Of the 13 studies, only 8 reported coping strategies. The coping strategies that students frequently utilized were staying optimistic and transference – such as "watching television and sleeping". Table 1 presents the levels of stress, main stressors and coping strategies reported in the reviewed papers.

Table 1. The levels of stress, main stressors and coping strategies reported in the reviewed papers in Article 1

Author(s)	Country	Level of stress (Low-Moderate-High)	Main clinical stressors reported	Main coping strategies reported
Al-Gamal et al., 2018.	Jordan	Moderate	The caring of patients	Problem-solving
Alzayyat & Al-Gamal, 2014a.	Jordan	Moderate	The caring of patients, workload and too much assignment	Problem-solving
Alzayyat & Al-Gamal, 2016.	Jordan	Moderate	The caring of patients, workload and too much assignment, and teachers & staff	Staying optimistic & problem solving
Bahadir-Yilmaz, 2016.	Turkey	Moderate	Criticism from teachers and encountering dying patients	Being self-confident & staying optimistic
Chan et al., 2009.	Hong-Kong	Moderate	Lack of professional knowledge & skills	Transference, staying optimistic, problem-solving & avoidance
Gurnova & Zelenikova, 2018.	Czech Republic and Slovakia	Moderate	Teachers and nursing staff, and friends	Not reported
Jimenez et al., 2012.	Spain	Moderate	Providing patient care & lack of knowledge and skills	Not reported
Liu et al., 2015.	China	Moderate	Being fearful of making mistakes and work overload.	Not reported
Rasha Mahfouz et al., 2016	Saudi Arabia	High	Not being able to control important things and upset	Seeking diversions & Self-reliance
Shaban et al., 2012.	Jordan	Moderate	Work overload, and too many assignments	Problem-solving, staying optimistic & transference
Suen et al., 2016. Singapore	Singapore	Moderate	Satisfaction in terms of fulfilment	Not reported
Zhao et al., 2015.	China	Moderate	Assignments & workload	Transference
Zupiria-Gorostidi et al., 2007.	Spain	Low	Lack of competence & uncertainty	Not reported

5.2 SUB-STUDY II: THE DEVELOPMENT OF A VALIDATED INSTRUMENT (ARTICLE II)

The first part of sub-study II (Article II) investigated the psychometric properties and theoretical factor structure of the PSS by using data from 189 Finnish undergraduate nursing students. The PSS originally contained 29 items under six sub-dimensions and was in the English version. It was translated to Finnish language and cross-culturally adapted using the five steps according to Guillemin et al. (2013) guidelines. The five steps were forward translation, synthesis, back translation, expert committee discussion, and pretesting.

During the pretesting phase, the Finnish version was subjected to nursing students' (n = 43) feedback. The students were requested to complete the questionnaire and give feedback on its conceptual meaning, wordings and other matters that could improve the questionnaire and suit a Finnish sample better. It emerged that five new items could be added to the PSS under different sub-dimensions. These new items could probably provide further information to measure stress accurately in relation to the Finnish context (For the items added and reasons see Article II results' section).

Applying the methods of psychometric testing, including EFA and CFA using Field (2018) guidelines, a 16-item 4-factor model addresses stress among nursing students during their clinical training. The 16-item 4-factor PSS fits better into the Finnish data than the 29-item 6-factor PSS that has been applied in previous studies. The 16-item 4-factor PSS shows that "lack of knowledge", "workload and clinical settings", "teachers and nursing staff", and "caring for patients" form the core components of stress among nursing students. The overall Cronbach alpha of the 16-item 4-factor PSS was 0.90. The Composite reliability of all four factors that formed the PSS was > .7. The four qualification indices including the Chi-square value divided by the degrees of freedom, Root Mean Square Error of Approximation, Comparative Fit Index, and Tucker-Lewis Index were 1.88, .07, .94, and .92 respectively. The 16-item 4-factor PSS met all the required four qualification indices, while the 29-item 6-factor model met only two of them.

5.3 SUB-STUDY II: FIRST-YEAR NURSING STUDENTS STRESS AND COPING STRATEGIES IN THE CLINICAL LEARNING ENVIRONMENT (ARTICLE III)

The second part of sub-study II (Article III) examined the stressors, stress levels, and coping strategies of 189 Finnish undergraduate nursing students during the initial clinical training period. Interestingly, this Finnish sample rarely perceived stress. The overall stress level was 1.07 (SD= .49). Table 2 presents the differences in the sub-dimensions of the PSS in this study as compared to previous studies.

Table 2. A comparison of M1 average stress scores using the Perceived Stress Scale with those of other studies.

Perceived Stress Scale (PSS)	Karaca et al. 2017 (n= 876)		Wejdan et al. 2014 (n= 286)		Shaban et al. 2012 (n= 181)		Jimenez et al. 2010 (n= 357)		This study (n= 189)	
	Mean±SD	*p	Mean±SD	*p	Mean±SD	*p	Mean±SD	*p	Mean±SD	*p
1. Stress from taking care of patients	2.37±0.96	< .01	1.30±0.71	< .01	1.49±0.74	< .01	2.17±0.83	< .01	1.25±0.55	< .01
2. Stress from assignments and workload	2.54±0.96	< .01	2.12±0.88	< .01	2.34±0.88	< .01	1.70±0.80	< .01	1.21±0.78	< .01
3. Stress from lack of professional knowledge and skills	2.12±1.19	< .01	1.29±0.94	< .01	1.72±1.01	< .01	1.94±0.69	< .01	1.49±0.82	< .01
4. Stress from the environment	2.30±1.11	< .01	1.43±0.90	< .01	1.88±0.80	< .01	1.68±0.87	< .01	0.97±0.69	< .01
5. Stress from peers and daily life	2.20±1.05	< .01	1.65±0.91	< .01	1.67±0.91	< .01	1.60±1.22	< .01	0.64±0.62	< .01
6. Stress from teachers and nursing staff	2.52±0.95	< .01	1.58±0.89	< .01	1.77±0.93	< .01	1.64±0.84	< .01	0.85±0.59	< .01
Total score	2.37±0.84	< .01	1.56±0.63	< .01	–	–	1.87±0.64	< .01	1.07±0.49	< .01

* Average scores of Perceived Stress Scale (PSS) of previous studies and compared with this study. The P values show the results of these comparisons.

Scale is from 0 - 4; 0 = never, 1 = infrequently, 2 = sometimes, 3 = frequently, 4 = always.

"Stress from lack of professional knowledge and skills" was the major stressful event (M = 1.49, SD = 0.82), whereas "stress from peers and daily life" was least stressful. In the context of coping, nursing students in this sample primarily utilized emotion-focused coping such as transference to cope. The least used coping strategy that was reported by the sample was "to quarrel with others and lose temper". Additionally, this study revealed that stress positively correlated with avoidance coping (r (186) = 0.37, p < 0.01).

5.4 SUB-STUDY II: CHANGES IN STRESS LEVELS AND COPING STRATEGIES AMONG NURSING STUDENTS IN THE CLINICAL LEARNING ENVIRONMENT (ARTICLE IV)

The third part of sub-study II (Article IV) examined the changes in stressors, stress levels and coping strategies among undergraduate Finnish nursing students. As explained earlier (see methods section), the same 189 nursing students from whom data were collected at M1 were followed in their second-study year and data were collected again at M2. Altogether, 131 students provided data at M2. Attrition bias was calculated from the students that did not provide data at M2 (n = 58).

No significant differences were found in terms of the socio-demographic characteristics, stress levels and coping strategies from the final sample (n = 131) and excluded group (n = 58). There was a statistically significant increase in overall stress level from moment 1 (M = 1.03, SD = .52) and moment 2 (M = 1.66, SD = .49) timings; t (129) = -12.01, p < .05, d = 1.23. The main stressor at M2 was "stress from lack of professional knowledge and skills". At M2, students used all coping strategies more frequently as compared to M1. The study revealed that the use of "transference" - such as "feasting and taking a long sleep" continued during the second study year too, and this was the primary way of coping from stress at M2. Figure 4a and 4b show the changes in stress and coping strategies sub-dimensions respectively.
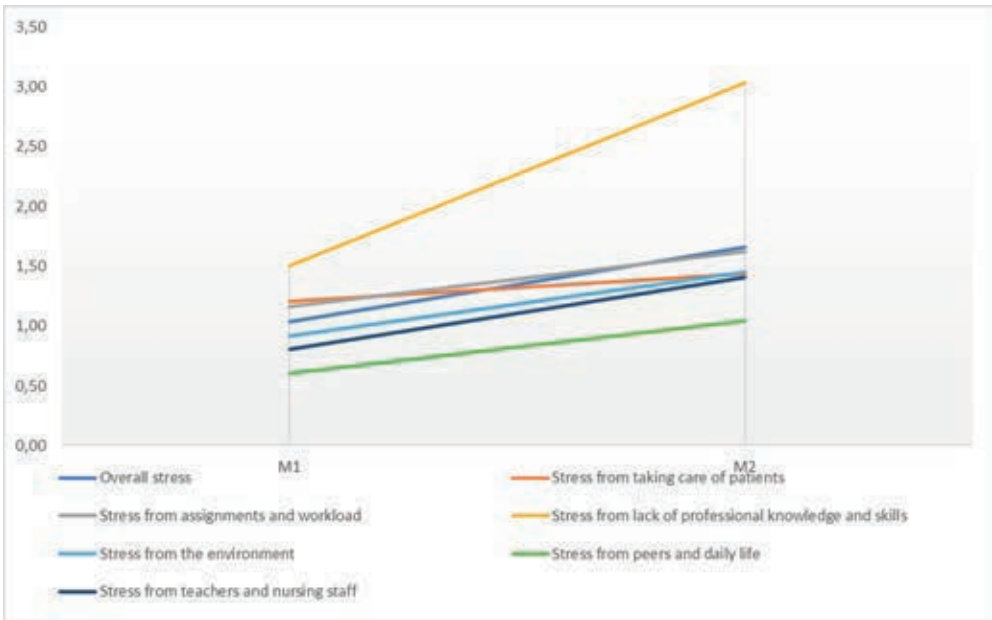
Figure 4a. Changes in stress levels from first to the second year of study

Scale is from 0 - 4; 0 = never, 1 = infrequently, 2 = sometimes, 3 = frequently, 4 = always.
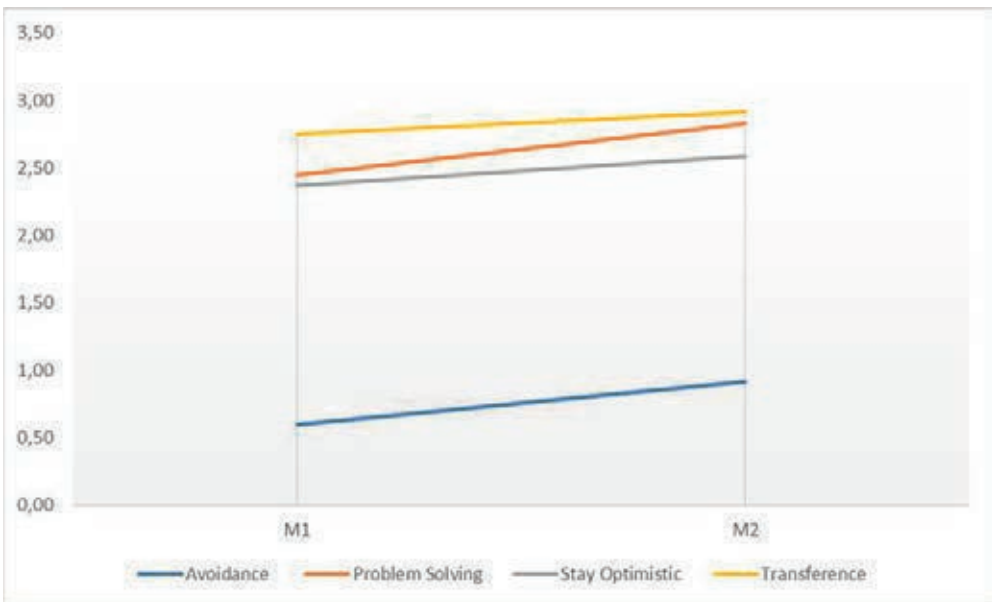
Figure 4b. Changes in coping strategies from first to the second year of study

Scale is from 0 - 4; 0 = never, 1 = infrequently, 2 = sometimes, 3 = frequently, 4 = always.

5.5 SUMMARY OF RESULTS

The present study investigated previous literature on stress and coping in the clinical learning environment as well as explored stress levels, sources of stress and coping strategies of first-year nursing students at five UAS in Finland and followed the same cohort in their second year.

First, evidence from existing literature showed that studies in this topic are mainly conducted in Asia and Middle East countries. Nursing students faced moderate levels of stress, and the primary stress sources were "stress from teachers and nursing staff". Students used both problem-focused and emotion-focused coping strategies. One primary coping strategy was "feasting and taking a long sleep".

Second, the English version of the stress scale PSS was modified and validated; a 16-item Finnish version of the scale was developed. This is a valid scale that can be used in future studies to measure stress levels in the Finnish context.

Third, Finnish first-year nursing students rarely experience stress from the initial period of training. They use emotion-focused coping predominantly; however, they use problem-focused coping too. Fourth, stress levels, stressors and coping strategies evolve during study years. As their studies progress, nursing students in this study´s sample reported a significant increase in levels of stress in their second year of study as compared to their first year. Further, they reported using coping strategies more often; feasting and taking a long sleep was a predominant coping strategy in the second year, which is considered an emotion-focused coping strategy.

Figure 5 summarizes the results of this study. The figure comprises of five elements. The four outer elements present the main findings of the two sub-studies (Sub-study I and Sub-study II). The inner element of the figure presents a synthesis of the main results of both sub-studies to provide a broader perceptive of the main results.

SUB-STUDY I (Article I)

Student nurses face moderate levels of stress during their clincial training. Most significant stressors are teachers and nursing staff. Nursing students use transference as main coping strategies

SUB-STUDY II (Article II)

A validated cross-culturally adapted version of the PSS is developed which included 16 items under 4 factors

Stress from the clinical learning environment is an international phenomena faced by nursing students

The use of a validated cross-culturally adapted version of the PSS can identify and quantify stress in a Finnish sample

There is emperical evidence on the evolution of stress and coping among Finnish nursing students such that, they face higher levels of stress in their second study year as compared to their first study year

A predominant coping strategy among this Finnish sample was feasting and taking a long sleep, which is an emotion-focused coping strategy

SUB-STUDY II (Article III)

Finnish undergraduate nursing students rarely experience stress during their initial period of clinical training

Most significant stressor is lack of knowledge and professional skills

Nursing students reported using both problem-focused and emotion-focused coping

SUB-STUDY II (Article IV)

Finnish undergraduate nursing students report higher levels of stress during their second study year

Most significant stressor is lack of knowledge and professional skills. They use emotion-focused coping predominantly, however, they do use problem-focused coping such as setting up objectives to solve problems
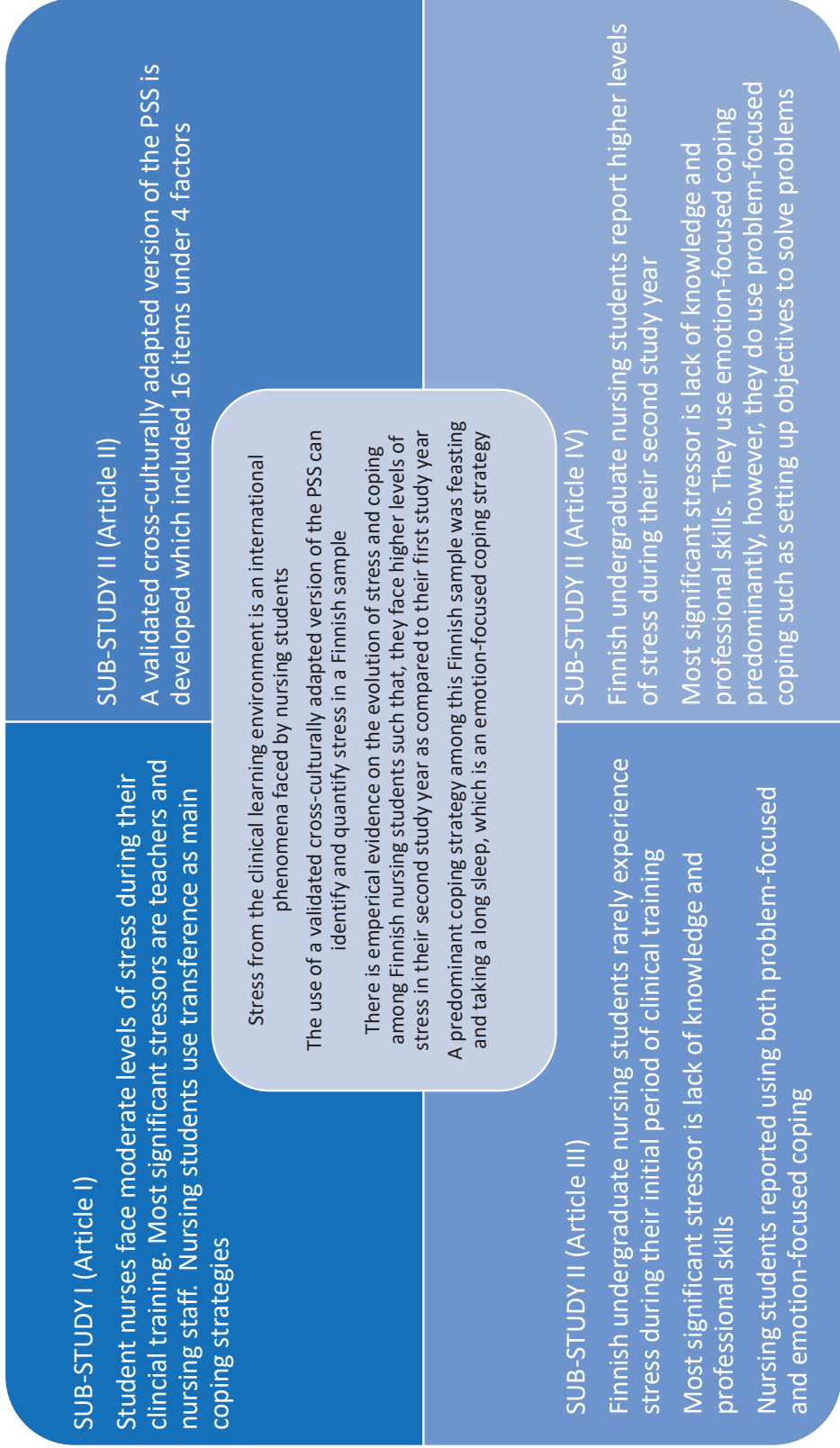
Figure 5. Summary of results on stress and coping strategies among Finnish nursing students in their clinical learning environment

5.6   PRELIMINARY FRAMEWORK ON NURSING STUDENTS' STRESS AND COPING IN THE CLINICAL LEARNING ENVIRONMENT

A preliminary transactional stress framework (figure 6) for nursing students has been constructed based on the results of this study. In the framework, stress, coping and outcomes of coping are organized such that the relationship between the nursing student and the clinical learning environment that is formed after the stress has been appraised is illustrated. The arrows show the continuum of stress, coping process, and outcomes. This preliminary framework is adapted from the transactional model of stress and coping of Lazarus and Folkman (1984) and the main findings of this study.

The preliminary framework includes the main elements for recognising stress and coping among nursing students in their clinical learning environment. The stressors in the clinical learning environment have also been presented. In this preliminary framework, the most significant elements are stressors (stresses in the clinical learning environment faced by students), coping strategies and outcomes, which are the core elements (the blue boxes) from the transactional model of stress and coping of Lazarus and Folkman (1984).

The findings of this study concerning the stressors and coping strategies in the clinical learning environment have been grouped in elements under the blue boxes, and the arrow shows the continuum of stress. They use both problem-based and emotion-based coping (as found in sub-study II, Articles III and IV) to alleviate the impact of these clinical stressors. The outcomes after such stressors are faced can be both beneficial and harmful.

Overall, this preliminary framework is an abstract explanation of stress in the clinical learning environment. It has been adapted from the transactional model of stress and coping of Lazarus and Folkman (1984) using the understanding of stress and coping among nursing students in the clinical learning environment based on the literature review and has been supplemented by the empirical findings of this study. The purpose of presenting this preliminary framework was to understand stress from a specific environment that includes specific types of stressors and affect nursing students only (Alzayyat & Al-Gamal, 2014b; Labrague et al., 2016; Labrague, 2018; Shaban et al., 2012). However, it should be noted that this preliminary framework has not been tested.

NURSING STUDENTS AND STRESSORS, THEY PERCEIVE IN THE CLINICAL LEARNING ENVIRONMENT

Stress from taking care of patients

Stress from assignments and workload

Stress from lack of professional knowledge and skills

Stress from the environment

Stress from peers and daily life

Stress from teachers and nursing staff

COPING STRATEGIES

Emotion-focused

Avoidance
Transference

Problem-focused

Stay optimistic
Problem solving

OUTCOMES
Health
Wellbeing
Learning process

Outcomes in the learning process
Favourable
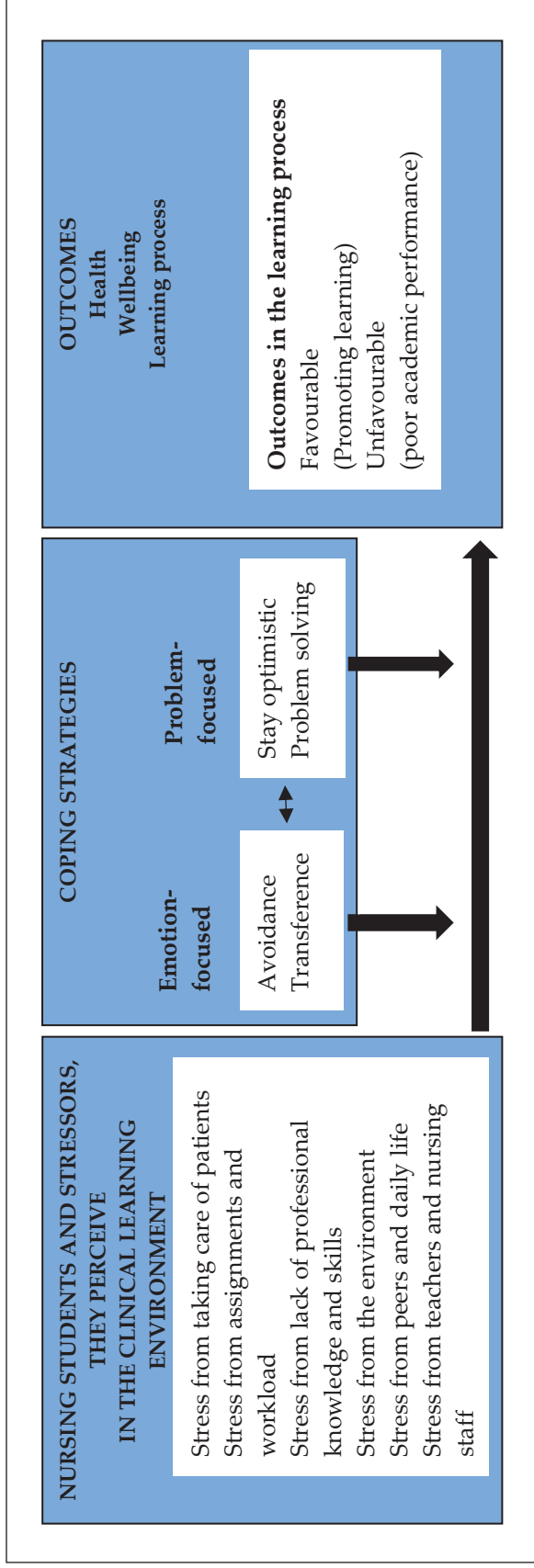(Promoting learning)
Unfavourable
(poor academic performance)

Figure 6. Preliminary framework on nursing students' stress and coping strategies for student nurses in the clinical learning environment.

6 DISCUSSION

6.1 DISCUSSION OF THE STUDY RESULTS

The purpose of this study was to describe and explain the stress levels, stressors, and coping strategies that undergraduate bachelor's level nursing students employ in the clinical learning environment within the Finnish context. In addition, the purpose was to evaluate an international stress scale and develop it further to measure Finnish nursing students' stress. The results of this study contribute new understanding and knowledge about stress and coping strategies among students within the Finnish context. Knowledge and understanding of this topic are scarce but essential for the development of nursing education in order to support students learning in the clinical learning environment (Gurková, E. & Zeleníková, 2018; Kaihlanen et al., 2020; Labrague et al., 2018).

A preliminary stress and coping strategies framework among nursing students has been developed based on the results of this study. This framework can be used to understand the stress and coping among nursing students in the context of their clinical training. Understanding stress in the context of the clinical learning environment is essential because nursing students have been reported to face stressors unique to them as compared to other population (Labrague et al., 2016; Mccarthy, 2018). The preliminary framework has not been tested and evaluated.

6.1.1 Stress and coping instruments to investigate stress and coping strategies

The preliminary step to understand stress among a population that has been understudied is the development of valid instruments that can be used to measure it. Previous literature reviews revealed that quantitative studies predominantly employed the PSS and CBI instruments to measure stress and coping strategies respectively (Alzayyat & Al-Gamal, 2014b; Labrague et al., 2016; Labrague, 2018).

Several studies have tested these two instruments and reported that both have sound psychometric properties including Cronbach's alpha and content validity (Al-Gamal et al., 2018; Alzayyat & Al-Gamal, 2014a; Alzayyat & Al-Gamal, 2016; Gurková & Zeleníková, 2018; Rasha & Haya, 2016; Sheu et al., 2002). In this present study, the PSS and CBI were translated and cross-culturally adapted following set guidelines (Guillemin et al., 1993). The four factors in the newly developed 16-item PSS including "lack of knowledge", "workload and clinical settings", "teachers and nursing staff", and "caring for patients" are potent stressors; reducing their effects may diminish stress levels in nursing students. Mentors, lecturers, nursing staff and researchers can capture the core components of stress that heavily influence stress levels by using the 16-item 4-factor model. This tool will allow for a comparison of

stress with other studies in other international contexts. The translated version of CBI showed satisfactory psychometric properties; therefore, no further factor or items modifications were conducted.

6.1.2   Stressors and stress levels in the clinical learning environment

The findings were that Finnish nursing students rarely face stress during their initial period of clinical training during their first study year, these results are partly in line with previous studies (Sheu et al., 2002; Zupiria Gorostidi et al., 2007). This can be explained because students doing their first clinical training are given less responsibility in the clinical learning environment, which may be a reason why they perceive lower levels of stress as compared to students in their second study year (Gibbons, 2010; Lo, 2002; Tully, 2004). Further, through stress is an international phenomenon among nursing students, the levels of stress and stressors may vary because of a different cohort, duration of the clinical training, mentorship, and cultural context (Labrague, 2013; Labrague et al., 2018; Pulido-Martos et al., 2012).

Finally, in Finland, first-year nursing students are supported considerably at their UAS by encouraging participation in laboratory classes, simulations, care case-studies, and dialogue training. The primary stressor in this study was "stress from lack of professional knowledge and skills". This result is supported by several previous studies too and can be explained partly because first-year nursing students possess only basic nursing competencies (Jimenez, Navia-Osorio, & Diaz, 2012; Karaca, Yildirim, Ankarali, Acikgoz, & Akkus, 2017; Sheu et al., 2002). Finnish nursing students mostly conduct their initial clinical training at nursing homes and long-term patient's hospital wards with older adults suffering complex, chronic and multiple diseases, which can be demanding on the knowledge and skills of nursing staff (Katana, 2019; Singh, 2015).

However, in the second study year, there was a significant increase in stress levels which is considered moderate according to the PSS. This finding is supported by the results of the literature review (Bhurtun et al., 2019) and other previous studies that found nursing students faced moderate levels of stress from the clinical learning environment (Chan et al., 2009; Shaban et al., 2012; Zhao, Lei, He, Gu, & Li, 2015). In general, the present study revealed the dynamic evolving nature of stress, confirming the results of Zupiria et al. (2007) longitudinal study. Specifically, this study can confirm that stress levels and stressors arising from the clinical learning environment change over time. This has been possible through the present study's longitudinal design by following the same participants over time.

In their second year, the sample reported that "stress from professional knowledge and skills" were again the primary source of stress and affected them more frequently as compared to their first year of study. These findings can be explained because second-year nursing students have been found to be more engaging with their studies, are exposed and given more responsibility in the clinical learning environment and expect more from themselves (Tully, 2004). One specific item that was found to cause nursing students significant stress was being unfamiliar

with medical terms and history. This was a bit problematic to understand at first, however upon more in-depth investigation, it was revealed that often second-year nursing students in Finland conducted their clinical training in the same clinical learning environments including medical-surgical clinics, intensive care units, complex surgical wards where third-year nursing students most often train.

It may be that second-year nursing students expected even more from themselves in those environments and unfamiliarity with medical terms and history resulted because nursing students either lacked the nursing competencies to understand these terms or they were still not acquainted to these terms at their UAS. The least stress-causing situations that they reported were "stress from peers and daily life" at both first and second study years, which can be elucidated that in Finland, students do not generally see their peers as academic competitors while teachers put less emphasis on competition and comparison (Voogt & Kasurien, 2005)

The sources of stress that nursing students faced during their first year and eventually in their second study year originated mainly from unfamiliarity which seemed to be focused in themselves and therefore justifies the use of the transactional stress theory of Lazarus and Folkman (1984). This can be explained because the core concepts of the Lazarus and Folkman (1984) stress theory is based on the unfamiliarity of the individual with the surrounding environment causing harm, challenge or threat. Among nursing students, being unfamiliar with the clinical learning environment specific parts, including patients' history and terms, diagnoses, treatments, and nursing skills, seemed to act as a challenge. Appraising these as challenges caused distress and taxed their depleting resources. Consequently, these findings endorse the use of the transactional stress theory as a guiding concept to examine stress and coping among nursing students because nursing students view stress as a situation that exceeds their abilities to manage the stress-causing situation.

6.1.3   Coping strategies used by nursing students

This present study revealed that nursing students employ coping strategies more frequently in their second study year because of rising stress levels. At both M1 and M2, they primarily employed emotion-focused coping. Specifically, they used transference which included "feasting and taking a long sleep", "to save time for sleep and maintain good health to face stress", and "to relax via TV, movies", "a shower, or physical exercises". These have been described by several authors as an ineffective way to cope with stress (Gibbons, 2010; Labrague, 2018; Tully, 2004). This is challenging to explain given that the sample also used effective coping strategies that are categorised as problem-focused, including "setting up objectives to solve problems" and "keeping an optimistic attitude". The sample use of such coping strategies can be justified partly because first-year nursing students still lack the necessary competences, experience, confidence and skills to use problem-focused

coping strategies as compared to experienced second- and third-year students (Gurková & Zeleníková, 2018; Tully, 2004).

Surprisingly, importantly and against expectations at M2, "to feast and take a long sleep" was reported as the most used coping strategy. Although this is seen as an ineffective emotion-focused coping strategy in general by many studies, in this sample, nursing students used them because they found it relevant in the context that it was used (Chan, 2006), and its interrelating effect with other problem-based effective coping strategies as explained by Lazarus and Folkman (1984). It is suspected that students engaged in the emotional-focused coping first so that they can undertake problem-focused coping more effectively, as suggested by Friedman (2011). Precisely, it is believed that students used "feasting and taking a long sleep" to dampen distress emotions from a "challenging clinical training day" allowing them to then concentrate and use effective problem-focused coping strategy calmly and better.

6.2   VALIDITY AND RELIABILITY

The rigour of the sub-study I (article I) has been implemented by the quality of the review process. The research questions, search terms and strategy, inclusion criteria, and appraisal of the studies included were guided by Whittemore and Knafl (2005). Together with the librarian, the keywords, search strategy, and databases were chosen and carefully documented Hawker et al. (2002).

Test searches were performed to explore the extent and limits of the search results and minimize search bias. Further, two researchers independently subjected the studies included for quality appraisal using an existing widely used evaluation form (see Hawker et al. 2002). The literature review design was guided by Whittemore and Knafl (2005), and the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analysis) checklist. As such, the study systematically proceeded through the review process and report of the overall progress (Moher et al., 2015).

The research group critically evaluated the review process to ensure and increase its reliability (Bettany-Saltikov, 2010). Only high-quality publications were included in the integrative review, and a Cohen's kappa score (K = 0.66) showed considerable agreement in regards to the two independent scholars that performed the appraisal. Since most studies included employed a quantitative design, a narrative, conceptual synthesis method was used to extract data as guided by Khan, Kunz, Kleijnen, & Antes Gerd (2003). The results were tabulated carefully and were critically reviewed by the research group to increase its trustworthiness (Bettany-Saltikov, 2010).

For sub-study II (article II), the statistician was consulted to develop and design the study. The validity of the study was considered by conducting a pilot study to ensure that each item in the PSS questionnaire was clear and understandable. Further, items that were not clear were revaluated. The translation and adaptation followed the guidelines of Guillemin et al. (1993), and the expert committee consisted

of the principal author and three senior researchers, all of whom hold a doctoral qualification. The validity of the PSS instrument was texted using the Statistical Package for Social Sciences (SPSS) version 25. The principal investigator and the statistician performed several tests, including EFA and CFA, to validate the PSS model. Several modification indices were used to establish "the best fitting model" including composite Reliability (CR), Average Variance Extracted (AVE), Maximum Shared Variance (MSV), and McDonald Construct Reliability (MaxR(H)). The guidelines of Stevens' (2002) was followed for items of PSS inclusions and loadings. Fornell & Larcker (1981) guidelines were followed by all modification indices cut-off values.

The CBI was translated following Guillemin et al. (1993) guidelines by the same expert committee. Both instruments have been widely used in previous studies. The Cronbach alphas of both PSS and CBI Finnish versions were found to be 0.92 and 0.90, respectively, indicating excellent internal consistency reliability (Field, 2018).

For sub-study II (article II-IV), the data collection at M1 and M2 followed the research plan and the ethical guidelines that were approved by the university where the research was conducted. In article III and IV, all analyses were performed and discussed with the statistician. The SPSS statistical software was used to determine the appropriate sample size. The minimum sample size to control for type I and type II errors was determined to be 64 using Field (2018) guidelines and considering previous similar studies that used a medium effect size of 0.5, power of 0.8 and significance level of 0.05 (Shaban et al., 2012). As a precaution, and according to Polit & Beck (2008) recommendations, a larger sample was recruited to allow for incomplete questionnaires, attrition and provide greater insight.

In summary, the trustworthiness of the study was attained by the quality of sub-study I (article I) (Muijs, 2011; Whittemore & Knafl, 2005) the dependability of sub-study II (article II) by confirming the methodological auditability, and the confirmability and transferability of articles III and IV in sub-study II by ensuring that preciseness and generalisability of the findings (Field, 2018; Muijs, 2011).

6.3   STRENGTH AND LIMITATIONS

A strength of this study is that an integrative literature was conducted to examine what was already known in this topic. Each step of the literature review was planned and discussed with the guiding information specialist. Further, the inclusion and exclusion criteria were pretested as well as the search terms. The review followed the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analysis) checklist to report the progress of the study (Moher et al., 2015). Two researchers independently subjected full-text studies in the appraisal process. Both the PSS and CBI were rigorously translated into the native language of the participants reducing

the risks of misunderstanding concepts. Another integrative review was conducted for the dissertation to obtain the latest evidence on the topic.

The pre-final version of both PSS and CBI were pilot tested using a sample of nursing students (n = 43). This led to further improvement in the PSS and CBI and identified problem areas. Students that participated in the pilot study were excluded in the final sample. The sample size was estimated by conducting a power analysis to control for type I and type II errors (Field, 2018). A larger sample was recruited to overcome problems such as incomplete questionnaires and attrition. The convenience sample was from 5 different UAS. The same questionnaires and data collection methods were used at both M1 and M2. Stress is a complex evolving phenomenon and can be best studied longitudinally as suggested by numerous previous literature reviews in this topic (Alzayyat & Al-Gamal, 2014a; Fornes - Vives, 2016; Lo, 2002; Zupiria Gorostidi et al., 2007). The data were collected immediately after students completed their clinical training because in coping research it has been suggested that participants often forget coping strategies with even noticeable stressors after a brief period of time has elapsed (Ptacek, Smith, Espe, & Raffety, 1994; Yüksel, 2019).

In terms of limitations, this present study's literature review consisted of major studies in English language only. The settings where stress was examined was limited to the clinical learning environment only, although students reported significant stresses from taking examinations and financial problems (Grant-Smith, 2019; Quinn & Peters, 2017). The 13 studies included in this study were all quantitative studies, mostly using cross-sectional data from one site only. Therefore, the results of the literature review (sub-study I) should be interpreted with caution. Data were collected by participants completing self-reported questionnaires, and participation was voluntary; this may have increase reporting bias.

Classifying every coping response as either a problem-based or emotion-based may be problematic according to Friedman (2011) because at times people use self-blame when confronted with stress which is an emotion-focused coping method, however, if the use of emotion-focused coping method diminishes distress, how does self-blame actually diminish negative feelings? Additionally, participants choose coping responses not only from the context of the situation they were during the clinical training and nature of the threat, harm or challenge but also on their personality basis. Personality has a significant effect on outcomes in life, including coping which is a crucial life outcome (Carver & Connor-Smith, 2010; Connor-Smith & Flachsbart, 2007; Solberg Nes & Segerstrom, 2006). One last issue on coping is other aspects of coping including adaptive coping, mal-coping, proactive-coping and emotional intelligence which is a topic that several researchers have just begin to understand (Enns, 2018; Labrague, 2018; Štiglic, 2018).

7 CONCLUSIONS AND RECOMMENDATIONS

1. Most studies that investigated stress and coping in the clinical learning environment used a quantitative cross-sectional descriptive design.
   - Future studies may use a qualitative design to further examine stress and coping because these are complex issues.

2. Several previous studies from around the world concluded that nursing students experience moderate to high levels of stress, and "teachers and nursing staff" are the most significant stressors.
   - Nursing teachers and mentors should recognise their role as a significant stressor to nursing students and improve the quality of supervision.
   - Policymakers should address for a common standard of supervision and mentoring at a national level that may address this challenge.

3. Previous literature also found out nursing students employ both problem-based and emotion-based coping strategies; however, problem-based coping is more effective.
   - Nursing teachers and mentors should encourage nursing students to use problem-based strategies to alleviate stress.

4. A valid and reliable 16-item 4 factor PSS has been developed. The use of a valid instrument to measure stress is crucial to identify stressors in a population that has been understudied.
   - Future researchers can use the 16-item 4-factor PSS to measure stress when investigating stress among nursing students' samples because it is a valid and reliable tool.

5. Due to the evolving nature of stress, levels of stress changes across study years.
   - Nursing teachers and mentors should support their prospective students going for clinical placement by acquainting them to stressors that exist in the clinical learning environment. While some stressors are inevitable, others can be alleviated by employing effective coping strategies and mentoring programmes.

6. In Finland, the primary source of stress arises from a "lack of professional knowledge and skills" followed by "assignments and workloads".
   - Nursing teachers should encourage their students to develop their skills in care labs extensively before clinical placement.
   - Nursing lecturers and mentors should review students' assignments and workloads during the time they are in the clinical learning environment.

- Nursing curriculum developers can consider the changing nature of stress that occur during clinical placement and design curriculums accordingly to support learning.

7. Transference is a primary coping strategy that Finnish students use. This is an ineffective emotion-based strategy.
    - Nursing teachers and mentors should acquaint students with effective problem-solving strategies.
    - Policymakers, nursing curriculum developers and clinical learning environment facilitators can provide direction to enhance students' coping as well as enforcing the role of a supportive clinical learning environment that is essential for the acquisition of skills for nursing students and as a graduate nurse.

8. The findings of this study provide essential information to nursing lecturers, clinical educators, nursing preceptors and clinical staff involved with nursing students to facilitate, alleviate and remove clinical stressors while promoting learning.
    - All actors involved in the clinical learning environment can use the results of the study to support nursing students more effectively.

8 SUGGESTIONS FOR FUTURE RESEARCH

1. Future research is needed to understand stress and coping even broader and in-depth.
2. Systematic literature reviews should be conducted encompassing broader terms and the whole nursing education.
3. Studies should follow mixed-method longitudinal designs following nursing students throughout their study period.
4. Because of the complex nature of stress and coping, the link between specific stressors and coping strategies should be examined.
5. Since personality is essential in stress and coping, future research should focus on the relationships between them.
6. The preliminary framework in this study is based on the stress theory of Lazarus and Folkman (1984), plausibly other guiding concepts of stress and coping should be included.
7. The effectiveness of coping strategies in alleviating stress is still under-researched.

REFERENCES

Admi, H. (2018). Nursing students' stress and satisfaction in clinical practice along different stages: A cross-sectional study. Nurse Education Today, 68, 86-92. doi:10.1016/j.nedt.2018.05.027

Akhu-Zaheya, L., Shaban, I., & Khater, W. (2015). Nursing students' perceived stress and influences in clinical performance. International Journal of Advanced Nursing Studies, 4(2), 44-48. doi:10.14419/ijans. v4i2.4311.

Al-Gamal, E., Alhosain, A., & Alsunaye, K. (2018). Stress and coping strategies among Saudi nursing students during clinical education. Perspectives in Psychiatric Care, 54(2), 198-205. doi:10.1111/ppc.12223.

Alsaqri, S. H. (2017). Stressors and coping strategies of the Saudi nursing students in the clinical training: A cross-sectional study. Education Research International, 2017 doi:10.1155/2017/4018470

Alzayyat, A., & Al-Gamal, E. (2014a). Perceived stress and coping strategies among Jordanian nursing students during clinical practice in psychiatric/mental health courses. International Journal of Mental Health Nursing, 23(4), 326-335. doi:10.1111/inm.12054.

Alzayyat, A., & Al-Gamal, E. (2014b). A review of the literature regarding stress among nursing students during their clinical education. International Nursing Review, 61(3), 406-415. doi:10.1111/inr.12114.

Alzayyat, A., & Al-Gamal, E. (2016). Correlates of stress and coping among Jordanian nursing students during clinical practice in psychiatric/mental health course. Stress and Health, 32(4), 304-312. doi:10.1002/smi.2606

American Psychiatric Association. Diagnostic and statistical manual of mental disorders (5th Ed.). Washington, DC, USA: American Psychological Association; 2014.

Bahadır-Yılmaz, E. (2016). Academic and clinical stress, stress resources and ways of coping among Turkish first-year nursing students in their first clinical practice. Kontakt, 18(3), e145-e151. doi:10.1016/j.kontakt.2016.08.001

Beanlands, H. (2019). Decreasing stress and supporting emotional well-being among senior nursing students: A pilot test of an evidence-based intervention. Nurse Education Today, 76, 222-227. doi: 10.1016/j.nedt.2019.02.009.

Bektas, H., Terkes, N., & Ozer, Z. (2018). Stress and ways of coping among first-year nursing students: A Turkish perspective. Journal of Human Sciences, 15, 319. doi:10.14687/jhs.v15i1.4626

Bettany-Saltikov J. (2010). Learning how to undertake a systematic review: part 1. Nursing Standard 24, 47–55.

Bhurtun, H. D., Azimirad, M., Saaranen, T., & Turunen, H. (2019). Stress and coping among nursing students during clinical training: An integrative review. The Journal of Nursing Education, 58(5), 266-272. doi:10.3928/01484834-20190422-04.

Blomberg, K., Bisholt, B., Kullén Engström, A., Ohlsson, U., Sundler Johansson, A., & Gustafsson, M. (2014). Swedish nursing students' experience of stress during clinical practice in relation to clinical setting characteristics and the organisation of the clinical education. Journal of Clinical Nursing, 23(15-16), 2264-2271. doi:10.1111/jocn.12506

Bodys-Cupak, I. (2018). First-Year Nursing Students' Coping Strategies in Stressful Clinical Practice Situations. Journal of Education in Science, Environment and Health, 4(1), p. 12.

Burnard, P. (2007). A descriptive study of Bruneian student nurses' perceptions of stress. Nurse Education Today, 27(7), pp. 808-818. doi: 10.1016/j.nedt.2006.11.002 Cambridge Dictionaries Online. 2020. Cambridge University Press. Online version 2020.

Carver, C. (1989). Assessing coping strategies - a theoretically based approach. Journal of Personality and Social Psychology, 56(2), pp. 267-283.

CCMH. (2016). Center for Collegiate Mental Health Annual Report. Available at https://ccmh.psu.edu/files/2017/01/2016-Annual-Report-FINAL_2016_01_09-1gc2hj6.pdf. (accessed 27 January 2020).

Chan, C. K. L., So, W. K. W., & Fong, D. Y. T. (2009). Hong Kong baccalaureate nursing students' stress and their coping strategies in clinical practice. Journal of Professional Nursing, 25(5), 307-313. doi: 10.1016/j.profnurs.2009.01.018.

Chan, K.L. (2006). Perceived stress and coping strategies of baccalaureate nursing students in clinical practice. Master of Nursing thesis. University of Hong Kong.

Chubin, D. E. & Hackett, E. J. 1990. Peerless science: peer review and U.S. science policy. State University of New York Press. Albany, NY.

Collins Dictionaries Online. 2020. HarperCollins Publishers. Online version 2020.

Connor-Smith, J.K., & Flachsbart, C. (2007). Relations between personality and coping: A meta-analysis. Journal of Personality and Social Psychology, 93, 1080–1107.

Deary, I. J., Watson, R., & Hogston, R. (2003). A longitudinal cohort study of burnout and attrition in nursing students. Journal of Advanced Nursing, 43(1), 71-81. doi:10.1046/j.1365-2648.2003.02674.x

Decree on Polytechnics 352/2003. (accessed 05.03.20) at: http://www.finlex.fi/fi/laki/ajantasa /2003/20030352.

Directive 2013/55/EU of the European Parliament and the Council of 20 November 2013 amending Directive 2005/36/EC on the recognition of qualifications and Regulation (EU) No 1024/2012 on administrative cooperation through the Internal Market Information System. Available at: http://www.eaeve.org/fileadmin/downloads/sop/DIR_2013_55_EU_amended_ rpq.pdf. (Accessed online: 14.4.20)

Enns, A. (2018). Perceived stress, coping strategies, and emotional intelligence: A cross-sectional study of university students in helping disciplines. Nurse Education Today, 68, 226-231. doi: 10.1016/j.nedt.2018.06.012.

Ensio, A., Lammintakanen, J., Härkönen, M., & Kinnunen, J. (2019). Strengthening health systems through nursing: Evidence from 14 european countries. In A. M. Rafferty, R. Busse, B. Zander-Jentsch, W. Sermeus & L.
Bruyneel (Eds.), Strengthening health systems through nursing: Evidence from 14 european countries (). Copenhagen (Denmark): European Observatory on Health Systems and Policies. Retrieved from http://www.ncbi.nlm.nih.gov/books/NBK545713/ (Accessed online: 14.4.20)

Eriksson, E., Korhonen, T., Merasto, M & Moisio, E.V. (2015). Sairaanhoitajan ammatillinen osaaminen - Sairaanhoitajakoulutuksen tulevaisuus -hanke (accessed 05.03.20), at: https://www.epressi.com/media/userfiles/15014/1442254031/loppuraportti-sairaanhoitajan-ammatillinen-osaaminen.pdf

EU directive 2001/19/EY. Directive 2001/19/EC of the European Parliament and of the Council of 14 May 2001 amending Council Directives 89/48/EEC and 92/51/EEC on the general system for the recognition of professional qualifications and Council Directives 77/452/EEC, 77/453/EEC, 78/686/EEC, 78/687/EEC, 78/1026/EEC, 78/1027/EEC, 80/154/EEC, 80/155/EEC, 85/384/EEC, 85/432/EEC, 85/433/EEC and

93/16/EEC concerning the professions of nurse responsible for general care, dental practitioner, veterinary surgeon, 67 midwife, architect, pharmacist and doctor. (accessed 05.03.20), at: http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32001L0019:EN:HTML.

EU directive 2005/36/EY. Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on the recognition of professional qualifications. Official Journal of the European Union (L255 /22–30). (accessed 05.03.20), at: http://eur-lex. europa.eu /LexUriServ/LexUriServ.do?uri=OJ:L:2005:255:0022:0142:en:PDF.

EU directive 77/452/ETY. Council Directive 77/452/EEC of 27 June 1977 concerning the mutual recognition of diplomas, certificates and other evidence of the formal qualifications of nurses responsible for general care, including measures to facilitate the effective exercise of this right of establishment and freedom to provide services. (accessed 05.03.20), at: http://eur-lex. europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31977L0452:EN:NOT

EU directive 77/453/ETY. Council Directive 77/453/EEC of 27 June 1977 concerning the coordination of provisions laid down by Law, Regulation or Administrative Action in respect of the activities of nurses responsible for general care. Retrieved online (5.5.20) at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31977L0453

EU directive 89/595/ETY. Council Directive 89/595/EEC of 10 October 1989 amending Directive 77/452/EEC concerning the mutual recognition of diplomas, certificates and other evidence of the formal qualifications of nurses responsible for general care, including measures to facilitate the effective exercise of the right of establishment and freedom to provide services, and amending Directive 77/453/EEC concerning the coordination of provisions laid down by law, regulation or administrative action in respect of the activities of nurses responsible for general care. (accessed 05.03.20), at: http://eurlex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&numdoc=31989L0595&mode l=guichett&lg=en

European Commission (2012). Final Commission Staff Working Document on an Action Plan for the Eu Health Workforce. Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: towards a Job-rich Recovery. Strasbourg 18.4.2012

Field, A. (2018). Discovering statistics using IBM SPSS statistics (5th edition ed.). London: SAGE Publications Ltd.

Finland Ministry of Education and Culture. (2006). Ammattikorkeakoulusta terveydenhuoltoon. Koulutuksesta valmistuvien ammatillinen osaaminen, keskeiset opinnot ja vähimmäispisteet [From polytechnic to working in health care. The professional competence, main studies and minimum learning requirements of graduating health care students] (In Finnish). Ministry of Education and Culture, Helsinki, Finland.

Finnish National Agency for Education. (2010). Vocational qualification in social and health care, practical nurse. Publications 2011.21. Finnish National Agency for Education, Helsinki, Finland.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18 (1), 39 –50.

Fornés-Vives, J., Garcia-Banda, G., Frias-Navarro, D., & Rosales-Viladrich, G. (2016). Coping, stress, and personality in Spanish nursing students: A longitudinal study. Nurse Education Today, 36, 318-323. doi:10.1016/j.nedt.2015.08.011

Freud, S. (1894). The neuro-psychoses of defence. SE, 3: 41-61.

Friedman, H. S. (2011). The oxford handbook of health psychology. Oxford: Oxford University Press.

Galvin, J., Suominen, E., Morgan, C., O'Connell, E., & Smith, A. P. (2015). Mental health nursing students' experiences of stress during training: A thematic analysis of qualitative interviews. Journal of Psychiatric and Mental Health Nursing, 22(10), 773. doi:10.1111/jpm.12273

General Data Protection Regulation (GDPR). (2018). Accessed online (31.10.2019) at: https://www.uef.fi/documents/1908796/0/EU+GDPR+englanniksi-dGBHHkyt.pdf/31348783-052d-46f3-925a-f1b6de28384f

Gibbons, C. (2010). Stress, coping and burn-out in nursing students. International Journal of Nursing Studies, 47(10), 1299-1309. doi: 10.1016/j.ijnurstu.2010.02.015.

Graham, M. M., Lindo, J., Bryan, V. D., & Weaver, S. (2016). Factors associated with stress among second year student nurses during clinical training in Jamaica. Journal of Professional Nursing, 32(5), 383-391. doi:10.1016/j.profnurs.2016.01.004

Grant-Smith, D. (2019). Don't spend, eat less, save more: Responses to the financial stress experienced by nursing students during unpaid clinical placements. Nurse Education in Practice, 35, 1-6. doi:10.1016/j.nepr.2018.12.005

Guillemin, F., Bombardier, C., & Beaton, D. (1993). Cross-cultural adaptation of health-related quality of life measures: Literature review and proposed guidelines. Journal of Clinical Epidemiology, 46(12), 1417-1432. doi:0895-4356(93)90142-N.

Gurková, E., & Zeleníková, R. (2018). Nursing students' perceived stress, coping strategies, health and supervisory approaches in clinical practice: A Slovak and Czech perspective. Nurse Education Today, 65, 4-10. doi:10.1016/j.nedt.2018.02.023

Haan, N. (1993). The assessment of coping, defense, and stress. In L. Goldberger & S.

Breznitz (Eds.), Handbook of stress: Theoretical and clinical aspects (p. 258–273).

Hafsteinsdóttir, T. B., Jónsdóttir, H., Kirkevold, M., Leino-Kilpi, H., Lomborg, K., & Rahm Hallberg, I. (2019). Leadership in nursing: Experiences from the European Nordic countries

Hamaideh, S. H., Al-Omari, H., & Al-Modallal, H. (2017). Nursing students' perceived stress and coping behaviors in clinical training in Saudi Arabia. Journal of Mental Health, 26(3), 197-203. doi:10.3109/09638237.2016.1139067

Hamshire, C., Willgoss, T. G., & Wibberley, C. (2012). 'The placement was probably the tipping point' – the narratives of recently discontinued students. Nurse Education in Practice, 12(4), 182-186. doi:10.1016/j.nepr.2011.11.004

Hawker, S., Payne, S., Kerr, C., Hardey, M., & Powell, J. (2002). Appraising the evidence: Reviewing disparate data systematically. Qualitative Health Research, 12(9), 1284-1299. doi:10.1177/1049732302238251

He, F. X., Lopez, V., & Leigh, M. C. (2012). Perceived acculturative stress and sense of coherence in Chinese nursing students in Australia. Nurse Education Today, 32(4), 345-350. doi: 10.1016/j.nedt.2011.05.004.

Helminen, K., Johnson, M., Isoaho, H., Turunen, H., & Tossavainen, K. (2017). Final assessment of nursing students in clinical practice: Perspectives of nursing teachers, students and mentors. Journal of Clinical Nursing, 26(23-24), 4795-4803. doi:10.1111/jocn.13835

Helminen, K., Tossavainen, K., & Turunen, H. (2014). Assessing clinical practice of student nurses: Views of teachers, mentors and students. Nurse Education Today, 34(8), 1161-1166. doi:10.1016/j.nedt.2014.04.007

Hentinen, M. (1989). Hoidon didaktiikan tutkimuksesta. Hoitotiede 1(1/89), 5-11.

Hobfoll, S.E. (1989). Conservation of resources: A new attempt at conceptualizing stress. American Psychologist, 44, 513–524.

Holmes, T. H. (1967). The social readjustment rating scale. Journal of Psychosomatic Research, 11(2), pp. 213-218. doi:10.1016/0022-3999(67)90010-4

Jimenez, C., Navia-Osorio, P. M. ´., & Diaz, C. V. (2012). Stress and health in novice and experienced nursing students. AJN, American Journal of Nursing, 112(3), 34-44. doi: 10.1097/01.NAJ.0000412637. 63022.d4.

Jokelainen, M., Turunen, H., Tossavainen, K., Jamookeeah, D., & Coco, K. (2011). A systematic review of mentoring nursing students in clinical placements. Journal of Clinical Nursing, 20(19-20), 2854-2867. doi:10.1111/j.1365-2702.2010.03571.x

Joolaee, S., Jafarian Amiri, S. R., Farahani, M. A., & Varaei, S. (2015). Iranian nursing students' preparedness for clinical training: A qualitative study. Nurse Education Today, 35(10), e13-e17. doi:10.1016/j.nedt.2015.07.026

Kaihlanen, A., Elovainio, M., Haavisto, E., Salminen, L., & Sinervo, T. (2020). Final clinical practicum, transition experience and turnover intentions among newly graduated nurses: A cross sectional study. Nurse Education Today, 84, 104245. doi:10.1016/j.nedt.2019.104245

Kaihlanen, A., Lakanmaa, R., & Salminen, L. (2013). The transition from nursing student to registered nurse: The mentor's possibilities to act as a supporter. Nurse Education in Practice, 13(5), 418-422. doi:10.1016/j.nepr.2013.01.001

Kaihlanen, A., Salminen, L., Flinkman, M., & Haavisto, E. (2019). Newly graduated nurses' perceptions of a final clinical practicum facilitating transition: A qualitative descriptive study. Collegian, 26(1), 55-61. doi:10.1016/j.colegn.2018.03.003

Karaca, A. (2017). Perceived level of clinical stress, stress responses and coping behaviours among nursing students. Journal of Psychiatric Nursing, pp. 32-39. doi:10.14744/phd.2017.22590

Katana, M. (2019). Emotion regulation, subjective well-being, and perceived stress in daily life of geriatric nurses. (report). Frontiers in Psychology, 10(MAY) doi:10.3389/fpsyg.2019.01097.

Khan, K.S., Kunz, R., Kleijnen, J., & Antes, G. (2003). Five steps to conducting a systematic review. Journal of the Royal Society of Medicine, 96(3), 118-121. Retrieved from https://uef.finna.fi/PrimoRecord/pci.sage_s10_1177_014107680309600304

Khater, W. A., Akhu-Zaheya, L. M., & Shaban, I. A. (2014). Sources of stress and coping behaviours in clinical practice among baccalaureate nursing students. International Journal of Humanities and Social Science, 4(6), 194-202. 202.

Kim, K. H. (2003). Baccalaureate nursing students' experiences of anxiety producing situations in the clinical setting. Contemporary Nurse: A Journal for the Australian Nursing Profession, 14(2), 145-55. doi:10.5172/conu.14.2.145.

Koivuniemi, S. (2012). Maahanmuuttajataustainen koulutettu hoitohenkilöstö sosiaali- ja terveydenhuollon työyhteisöissä. Tehy ry. Tehyn julkaisusarja B: 1/2012. Vantaa.

Kunttu, K., Pesonen, T., Saari, J. (2016). Korkeakouluopiskelijoiden terveystutkimus 2016. Available at: http://www.yths.fi/filebank/4237-KOTT_2016_korjattu_final_0217.pdf. [In Finnish] (accessed 27 January 2020).

Labrague, L. (2018). An integrative review on coping skills in nursing students: Implications for policymaking doi:10.1111/inr.12393.

Labrague, L. J. (2013). Stress, stressors, and stress responses of student nurses in a government nursing school. Health Science Journal, 7(4), pp. 424-435.

Labrague, McEnroe-Petitte, D. M., Gloe, D., Thomas, L., Papathanasiou, I. V., & Tsaras, K. (2016). A literature review on stress and coping strategies in nursing students. Journal of Mental Health, 1-10. doi:10.1080/09638237.2016.1244721.

Labrague, McEnroe-Petitte, D. M., Papathanasiou, I. V., Edet, O. B., Tsaras, K., Leocadio, M. C., Velacaria, P. I. T. (2018). Stress and coping strategies among nursing students: An international study. Journal of Mental Health (Abingdon, England), 27(5), 402-408. doi:10.1080/09638237.2017.1417552.

Lazarus, R. S., & Folkman, S. (1984). Stress, Appraisal, and Coping. Springer Publishing, New York, NY.

Leventhal, H., Brissette, I., & Leventhal, E.A. (2003). The common-sense model of self-regulation of health and illness. In L.D. Cameron, & H. Leventhal (Eds.), The self-regulation of health and illness behaviour (pp. 42–65). New York: Routledge.

Liu, M., Gu, K., Wong, T. K. S., Luo, M. Z., & Chan, M. Y. (2015). Perceived stress among Macao nursing students in the clinical learning environment. International Journal of Nursing Sciences, 2(2), 128-133. doi: 10.1016/j.ijnss.2015.04.013.

Lo, R. (2002). A longitudinal study of perceived level of stress, coping and self-esteem of undergraduate nursing students: An Australian case study. Journal of Advanced Nursing, 39(2), 119-126. doi:10.1046/j.1365-2648.2000.02251.

Lovallo, W. R., & Lovallo, W. R. (2005). Stress & health: Biological and psychological interactions (2nd ed.). Thousand Oaks, Calif: Sage Publications.

Mahfouz, R., & Alsahli, H. (2016). Perceived stress and coping strategies among newly nurse students in clinical practice. Journal of Education and Practice, 7(23), 118-128.

Mccarthy, B. (2018). Nursing and midwifery students' stress and coping during their undergraduate education programmes: An integrative review. Nurse Education Today, 61, 197-209. doi: 10.1016/j.nedt.2017.11.029.

Ministry of Education and Culture announcement (2019). (accessed 05.03.20), at: https://minedu.fi/artikkeli/-/asset_publisher/sairaanhoitajakoulutuksen-aloituspaikkoja-lisataan-180-lla-ensi-vuonna

Ministry of Education and Culture financial report (2015). Opetus- ja kulttuuritoimen rahoitusjärjestelmän raportit 2015. (accessed 05.03.20), at: https://vos.oph.fi/rap/kust/v14/k04z6dt.html (Original in Finnish)

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Stewart, L. A. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Systematic Reviews, 4(1), 1. doi:10.1186/2046-4053-4-1.

Morling, B. & Evered, S. (2006). Secondary control reviewed and defined. Psychological Bulletin, 132, 269–296.

Muijs, D. (2011). Doing quantitative research in education with SPSS (2. ed. ed.). Los Angeles

Najafi Doulatabad, S., Mohamadhosaini, S., Ghafarian Shirazi, H. R., & Mohebbi, Z. (2015). Nursing students in iran identify the clinical environment stressors. International Journal of Nursing Practice, 21(3), 297-302. doi:10.1111/ijn.12276
Neuman's system model. (2011). (accessed 05.03.20) at: https://www.neumansystemsmodel.org/

OKM. Extra grant for increase in nursing student's intake 2020. (2019). Available at: https://minedu.fi/documents/1410845/3547354/Liite_03072019.pdf/9c67a989-d974-6fcc-c541-ba161c3db413/Liite_03072019.pdf [In Finnish] (accessed 27 January 2020).

OKM. New intakes in higher education. (2014). Available at: http://minedu.fi/artikkeli/-/asset_publisher/korkeakouluihin-3000-uutta-aloituspaikkaa-opiskelijoille [In Finnish] (accessed 27 January 2020).

Papastavrou, E., Dimitriadou, M., Tsangari, H., & Andreou, C. (2016). Nursing students' satisfaction of the clinical learning environment: A research study. BMC Nursing, 15(1), 44. doi:10.1186/s12912-016-0164-4

Papp, I., Markkanen, M., & von Bonsdorff, M. (2003). Clinical environment as a learning environment: Student nurses' perceptions concerning clinical learning experiences. Nurse Education Today, 23(4), 262-268. doi:10.1016/S0260-6917(02)00185-5

Peterson-Graziose, V., Bryer, J., & Nikolaidou, M. (2013). Self-esteem and self-efficacy as predictors of attrition in associate degree nursing students. Journal of Nursing Education; 52(6), 351-354. doi:10.3928/01484834-20130520-01

Pitkänen, P., Vartiainen, P., & Koskela, M. (2018). Sairaanhoitajia filippiineiltä. Tampere: Tampere University Press.

Pollock, S.1984., The stress response. Critical Care Quarterly. 3, 1-13.

Polytechnic Act 351/2003. (accessed 05.03.20) at: http://www.finlex.fi/fi/laki/ajantasa/m, 2003/20030351

Pryjmachuk, S., Easton, K., & Littlewood, A. (2009). Nurse education: Factors associated with attrition. Journal of Advanced Nursing; 65(1), 149-160. doi:10.1111/j.1365-2648.2008.04852.x

Ptacek, J.T., Smith, R.E., Espe, K., & Raffety, B. (1994). Limited correspondence between daily coping reports and retrospective coping recall. Psychological Assessment, 6, 41–49.

Pulido-Martos, M., Augusto-Landa, J. M., & Lopez-Zafra, E. (2012). Sources of stress in nursing students: A systematic review of quantitative studies. International Nursing Review, 59(1), 15-25. doi:10.1111/j.1466-7657.2011.00939.

Quinn, B. L., & Peters, A. (2017). Strategies to reduce nursing student test anxiety: A literature review. Journal of Nursing Education, 56(3), 145. doi:10.3928/01484834-20170222-05.

Rafati, F., Nouhi, E., Sabzevari, S., & Nahid Dehghan-Nayeri. (2017). Coping strategies of nursing students for dealing with stress in clinical setting: A qualitative study. Electronic Physician, 9(12), 6120-6128. doi:10.19082/6120

Ranjbar, H. (2016). Stress management: An ignored challenge in clinical nursing education. Nurse Education Today, 36, 10. doi:10.1016/j.nedt.2015.10.004

Rasha, M., & Haya, A. (2016). Perceived Stress and Coping Strategies among Newly Nurse Students in Clinical Practice. Journal of Education and Practice, 7(23), p. 118.

Reeve, K. L. (2013). Perceived stress and social support in undergraduate nursing students' educational experiences. Nurse Education Today, 33(4), pp. 419-424. doi: 10.1016/j.nedt.2012.11.009

Rotter, J. B. (1966) Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs, 80 Sanders, G.S. & Suls, J. (Eds.), Social psychology of health and illness (pp. 1–25).

Saarikoski, M. (2009). The role of the nurse teacher in clinical practice: An empirical study of Finnish student nurse experiences. Nurse Education Today, 29(6), pp. 595-600. doi: 10.1016/j.nedt.2009.01.005

Saarikoski, M. (2018). The CLES-scale: An evaluation tool for healthcare education doi:10.1007/978-3-319-63649-8.

Saarikoski, M., & Leino-Kilpi, H. (1999). Association between quality of ward nursing care and students' assessment of the ward as a learning environment. Nursing Times Research, 4(6), 467-474. doi:10.1177/136140969900400611

Sandhya Ghai, Monika Dutta, & Aarti Garg. (2014). Perceived level of stress, stressors and coping behaviours in nursing students. Indian Journal of Positive Psychology, 5(1), 60.

Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health – Assessment and implications of generalized outcome expectancies. Health Psychology, 4(3), 219–247.

Selye, H. (1980). The Stress Concept Today. In I. L. Kutash et al. (Eds.), Handbook on Stress and Anxiety. San Francisco, CA: Jossey-Bass.

Shaban, I. A., Khater, W. A., & Akhu-Zaheya, L. M. (2012). Undergraduate nursing students' stress sources and coping behaviours during their initial period of clinical training: A Jordanian perspective. Nurse Education in Practice, 12(4), 204. doi: 10.1016/j.nepr.2012.01.005.

Sheu, S., Lin, H., & Hwang, S. (2002). Perceived stress and physio-psycho-social status of nursing students during their initial period of clinical practice: The effect of coping behaviours. International Journal of Nursing Studies, 39(2), 165-175. DOI: 10.1016/S0020-7489(01)00016-5

Singh, I. (2015). Does nurses' education reduce their work-related stress in the care of older people? Journal of Clinical Gerontology and Geriatrics, 6(1), 34-37. doi: 10.1016/j.jcgg.2014.09.003.

Smith, G., & Yang, F. (2017). Stress, resilience and psychological well-being in Chinese undergraduate nursing students. Nurse Education Today; 49, 90-95. doi:10.1016/j.nedt.2016.10.004

Solberg Nes, L., & Segerstrom, S.C. (2006). Dispositional optimism and coping: A meta-analytic review. Personality and Social Psychology Review, 10(3), pp. 235-251. doi:10.1207/s15327957pspr1003_3

Statistics Finland, (2020). (accessed 05.03.20), at: http://www.stat.fi.ezproxy.uef.fi:2048/til/kkesk/2017/kkesk_2017_2019-03-14_tie_001_en.html

Štiglic, G. (2018). Emotional intelligence among nursing students: Findings from a cross-sectional study. Nurse Education Today, 66, 33-38. doi: 10.1016/j.nedt.2018.03.028.

Strandell-Laine, C., Stolt, M., Leino-Kilpi, H., & Saarikoski, M. (2015). Use of mobile devices in nursing student–nurse teacher cooperation during the clinical practicum: An integrative review. Nurse Education Today, 35(3), 493-499. doi: 10.1016/j.nedt.2014.10.007.

Study.Eu. (2020). Universities of Applied Sciences in Finland: All you need to know. (accessed 05.03.20), at: https://www.study.eu/article/universities-of-applied-sciences-in-finland-all-you-need-to-know

Suarez-Garcia, J. (2018). Stressors for Spanish nursing students in clinical practice. Nurse Education Today, 64, 16-20. doi: 10.1016/j.nedt.2018.02.001.

Suen, W.Q., Lim, S., Wang, W., & Kowitlawakul, Y. (2016). Stressors and expectations of undergraduate nursing students during clinical practice in Singapore. International Journal of Nursing Practice, 22(6), 574-583. doi:10.1111/ijn.12473

Suresh, P., Matthews, A., & Coyne, I. (2013). Stress and stressors in the clinical environment: A comparative study of fourth-year student nurses and newly

qualified general nurses in Ireland. Journal of Clinical Nursing, 22(5-6), 770-779. doi:10.1111/j.1365-2702.2012.04145.x mong Norwegian nurse students after a period of clinical practice.3(9) doi:10.7717/peerj.1286

TENK. (2012). Finnish National Board on Research Integrity. Responsible conduct of research and procedures for handling allegations of misconduct in Finland. Available at https://www.tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf. (accessed 27 January 2020).

THL (2018). Terveys- ja sosiaalipalvelujen henkilöstö 2014. (accessed 05.03.20), at: http://www.julkari.fi/bitstream/handle/10024/135915/TR_01_18.pdf?sequence=1&isAllowed=y

THL (2020). Finnish Institute for health and welfare. Accessed online (11.04.20) at: https://thl.fi/en/web/ageing

Tully, A. (2004). Stress, sources of stress and ways of coping among psychiatric nursing students. Journal of Psychiatric and Mental Health Nursing, 11(1), 43-47. doi:10.1111/j.1365-2850.2004.00682.

Turner, K. & McCarthy, V.L. (2017). Stress and anxiety among nursing students: A review of intervention strategies in literature between 2009 and 2015. Nurse Education in Practice, 22, 21–29.

Valero-Chillerón, M. J. (2019). Burnout syndrome in nursing students: An observational study. Nurse Education Today, 76, 38-43. doi: 10.1016/j.nedt.2019.01.014.

Vanhanen, L., & Janhonen, S. (2000). Changes in students' orientations to nursing during nursing education. Nurse Education Today, 20(8), 654-661. doi:10.1054/nedt.2000.0485

Vanhanen, L., Hentinen, M., & Janhonen, S. (1999). Students' orientations to nursing at the beginning of nursing education. Nordic Journal of Nursing Research, 19(3), 18-23. doi:10.1177/010740839901900304

Vanhanen-Nuutinen, L., Janhonen, S., Maunu, M., & Laukkala, H. (2012). Changes in Finnish nursing students' nursing orientations between mid 1990s and mid-2000s. Nurse Education Today, 32(5), 490-496. doi:10.1016/j.nedt.2011.08.010

Vierula, J., Stolt, M., Salminen, L., Leino-Kilpi, H., & Tuomi, J. (2016). Nursing education research in Finland—A review of doctoral dissertations. Nurse Education Today, 37, 145-154. doi:10.1016/j.nedt.2015.10.014

Voogt, J., & Kasurinen, H. (2005). Finland: Emphasising development instead of competition and comparison. Formative Assessment: Improving Learning in Secondary Classrooms, 149-156.

Waled A.M. Ahmed, P., & Badria M.A. Mohammed, P. (2019). Nursing students' stress and coping strategies during clinical training in KSA. Journal of Taibah University Medical Sciences, 14(2), 116-122. doi:10.1016/j.jtumed.2019.02.002

Wang, W., Karki, A & Cheng, M. (2014). Guides for stress coping during clinical training for international degree nursing students. Lahden ammattikorkeakoulu 2014 thesis. Retrieved from https://masto.finna.fi/Record/theseus_phkk.10024_72362

Whittemore, R., & Knafl, K. (2005). The integrative review: Updated methodology. Journal of Advanced Nursing, 52(5), 546-553. doi:10.1111/j.1365-2648.2005.03621.x

Wolf, L. (2015). Predictors of stress and coping strategies of US accelerated vs. generic baccalaureate nursing students: An embedded mixed methods study. Nurse Education Today, 35(1), 201-205.

World Health Organization. (2019). Stress at the workplace. Available at https://www.who.int/occupational_health/topics/stressatwp/en/

Yildiz Findik, U., Ozbas, A., Cavdar, I., Yildizeli Topcu, S., & Onler, E. (2015). Assessment of nursing students' stress levels and coping strategies in operating room practice. Nurse Education in Practice, 15(3), 192-195. doi:10.1016/j.nepr.2014.11.008

Yüksel, A. (2019). The effect of mentoring program on adjustment to university and ways of coping with stress in nursing students: A quasi-experimental study. Nurse Education Today, 80, 52-58. doi: 10.1016/j.nedt.2019.06.006.

Zhao, F., Lei, X., He, W., Gu, Y., & Li, D. (2015). The study of perceived stress, coping strategy and self-efficacy of Chinese undergraduate nursing students in clinical practice. International Journal of Nursing Practice, 21(4), 401-409. doi:10.1111/ijn.12273.

Ziman, J. (2000). Real science: what it is and what it means (p.145). Cambridge University Press. Cambridge, UK.

Zupiria Gorostidi, X., Huitzi Egilegor, X., Jose Alberdi Erice, M., Jose Uranga Iturriotz, M., Eizmendi Garate, I., Barandiaran Lasa, M., & Sanz Cascante, X. (2007). Stress sources in nursing practice. evolution during nursing training. Nurse Education Today, 27(7), 777-787. doi: 10.1016/j.nedt.2006.10.017.

APPENDICES

Appendix 1   Search strategy and results of the first phase of the review

Appendix 2   Inclusion criteria in literature search

Appendix 3   Progression of review flowchart

Appendix 4   Conceptual framework used, main stressors and coping strategies
reported in the reviewed papers

Appendix 5   Prisma diagram from sub-study I (Article I)

Appendix 6   Search terms used in the databases from sub-study I (Article I)

APPENDIX 1

Appendix 1. Search strategy and results of the first phase of the review

Database	Search strategy Limitations in all databases: Criteria 1, 2 and 3	Search results with inclusion criteria n
CINAHL	((stress OR distress) OR (coping strategies or coping skills or coping or cope or coping mechanisms or strategies)) AND (nursing students or student nurses or undergraduate student nurses or pre-licensure nurse) AND (clinical training or clinical practice or clinical learning environment)	752
MEDLINE	((stress or distress) and (coping strategies or coping skills or coping or cope or coping mechanisms or strategies) and (nursing students or student nurses or undergraduate student nurses or pre-licensure nurse) and (clinical training or clinical practice or clinical learning environment).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	282
PsycINFO	((stress OR distress) OR (coping strategies or coping skills or coping or cope or coping mechanisms or strategies)) AND (nursing students or student nurses or undergraduate student nurses or pre-licensure nurse) AND (clinical training or clinical practice or clinical learning environment)	198
SCOPUS	((stress OR distress) OR (coping AND strategies OR coping AND skills OR coping OR cope O R coping AND mechanisms OR strategies)) AND (nursing AND students OR student AND nurses OR undergraduate AND student AND nurses OR pre-licensure AND nurse) AND (clinical AND training OR clinical AND practice OR clinical AND learni ng AND environment) AND (LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010)) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SUBJAREA , "NURS")) AND (LIMIT-TO (LANGUAGE , "English")) Further limitations: articles and Nursing	1229
ERIC	((stress OR distress) OR (coping strategies or coping skills or coping or cope or coping mechanisms or strategies)) AND (nursing students or student nurses or undergraduate student nurses or pre-licensure nurse) AND (clinical training or clinical practice or clinical learning environment)	32

APPENDIX 2

Appendix 2. Inclusion criteria in literature search

|		
Criterion 1	Time duration	Literature during the last 10 years (2010-2020)
Criterion 2	Language	English
Criterion 3	Terms/concepts/Keywords	((stress OR distress) OR (coping strategies or coping skills or coping or cope or coping mechanisms or strategies)) AND (nursing students or student nurses or undergraduate student nurses or pre-licensure nurse) AND (clinical training or clinical practice or clinical learning environment)
Criterion 4	Content	Undergraduate bachelor level in clinical learning environment
Criterion 5	Publication	In peer-reviewed scientific journals

APPENDIX 3
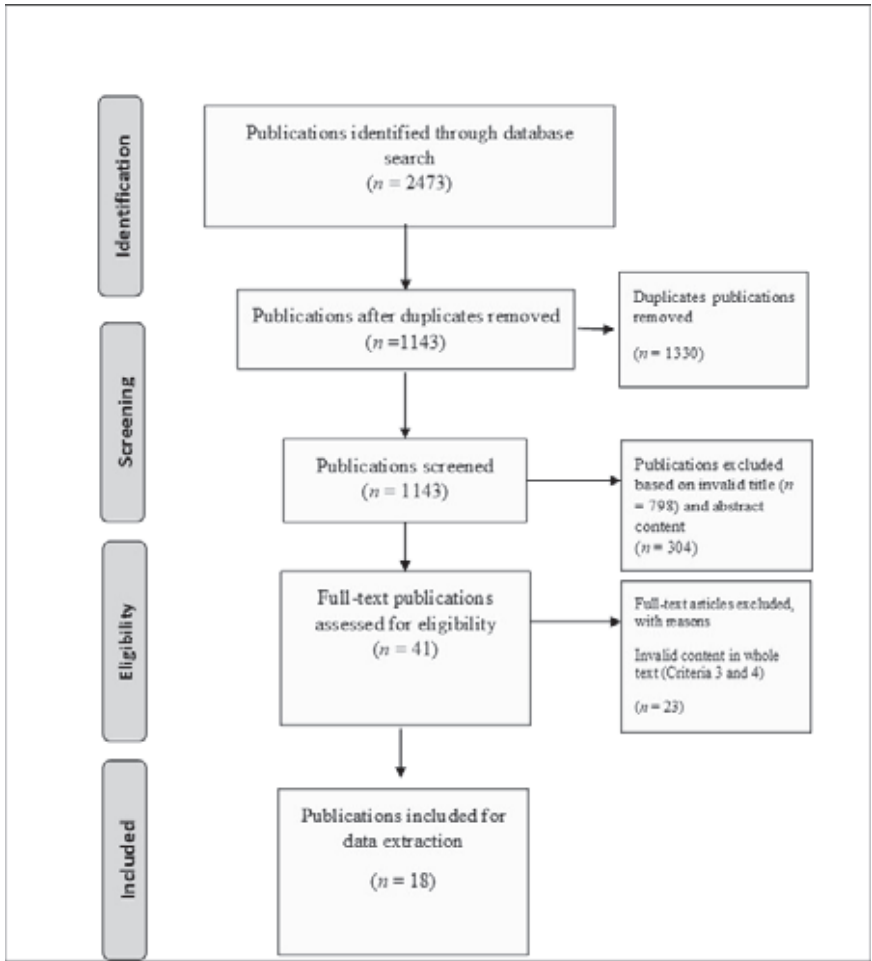
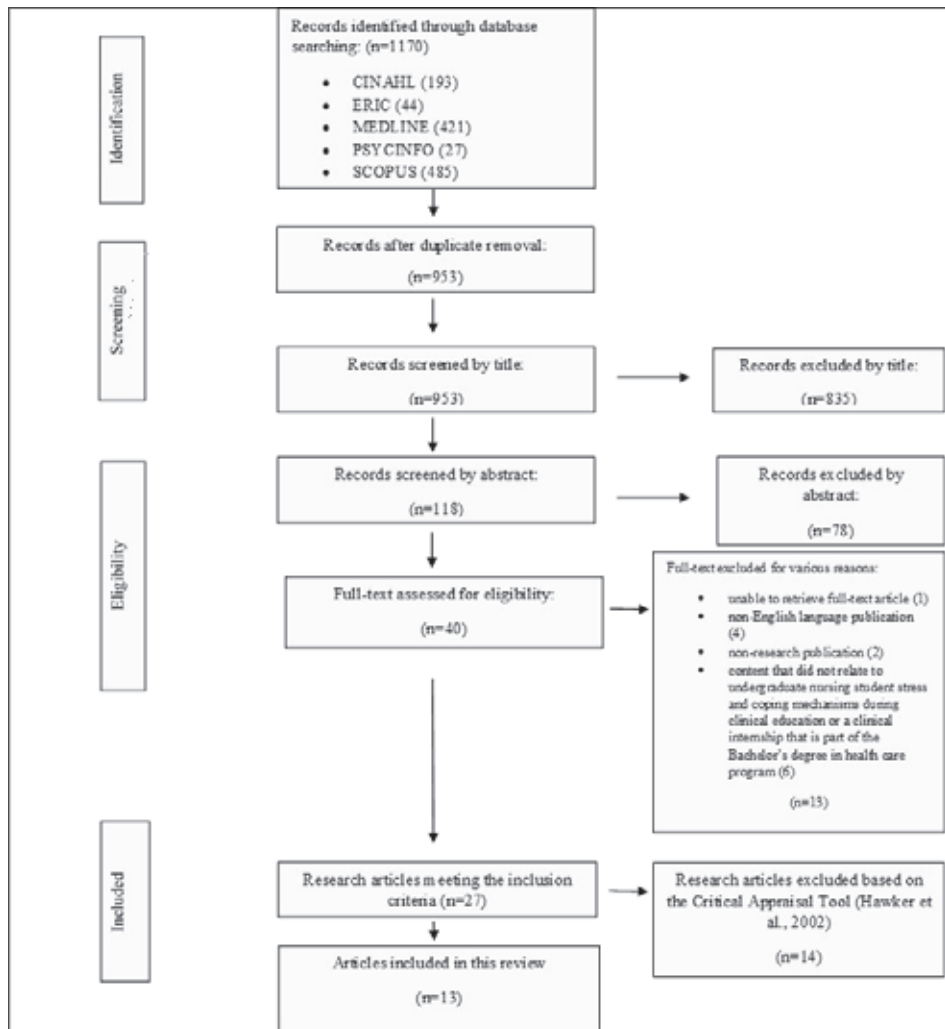Appendix 3. Progression of review flowchart figure

APPENDIX 4

Appendix 4. Conceptual framework used, main stressors and coping strategies reported in the reviewed papers

Author(s)	Country	Conceptual framework	Research question/aim	Sample	Research Design	Instrument/tool	Main clinical stressors	Main coping Strategies
Al-Gamal et al. (2018)	Saudi Arabia	Lazarus and Folkman (1984)	To explore the stress and coping strategies that students in Saudi Arabian employ	121 female Saudi undergraduate nursing students	Cross-sectional	Demographic Information Questionnaire, Perceived Stress Scale, and Coping Behaviour Inventory	Taking care of patient	Problem-solving strategy
Alsaqri (2017)	Saudi Arabia	Not mentioned	To find out about stress and coping strategies that students used in Saudi Arabia	200 nursing students	Cross-sectional	Perceived Stress Scale, coping behaviour inventory	Assignments and workload	Problem-solving
Bahadir-Yilmaz (2016)	Turkey	Lazarus and Folkman (1984)	To investigate stress and coping among students in Turkey	109 nursing students	Cross-sectional	Personal Information Form, Ways of Coping Inventory (WCI) and Nursing Education Stress Scale (NESS)	Exams and teachers in clinical environments	Self-confident and optimistic approaches
Bektas et al. (2018)	Turkey	Not mentioned	To examine stress among students in the first year in Turkey	90 nursing students	Cross-sectional	Demographic questions, the Pagana Clinical Stress Questionnaire (CSQ) and the Ways of Coping Questionnaire (WCQ)	Encounter new situation and environment	Self-confident approach and optimistic approach
Blomberg et al. (2014)	Sweden	Lazarus and Folkman (1984)	To give a description on the stresses and coping styles of nursing students	184 final year nursing students	Cross-sectional	A numerical rating scale (NRS–10) questionnaire developed specifically for the study	Too many patients and own's performance	Not measured
Fornes-Vives et al. (2016)	Spain	Lazarus and Folkman (1984)	To examine the main coping strategies that students used when they face stress.	199 nursing students	Two-wave longitudinal design	Stressful Life Events Scale, NEO-FFI, and COPE questionnaire	Not measured	Emotion-focused coping

Author (Year)	Country	Framework	Aim	Sample	Design	Data collection instrument	Stressors	Coping
Galvin (2015)	England	Not mentioned	To investigate stress in students doing mental health training	12 nursing students	Grounded theory thematic analysis	Semi-structured one-to-one interviews	Unreasonable demands and Negative attitudes towards students from staff	Not measured
Graham et al. (2016)	Jamaica	The Neuman's System Model (2011)	To evaluate stress levels and the related stressors in the clinical environment	106 second-year nursing students	Cross-sectional	30-item self-administered questionnaire	Financial concerns and interaction with the nursing staff	Not measured
Gurkova et al. (2018)	Slovak and Czech	Not mentioned	To find the relationship between stress and other variables that may affect stress and coping	275 nursing students	Cross-sectional	Perceived Stress Scale; Physio-Psycho-Social Response Scale, and Coping Behaviour Inventory	Teachers, peers, lack of professional knowledge and skills,	Avoidance
Hamaideh et al. (2019)	Saudi Arabia	Lazarus and Folkman (1984)	To find the levels of stress and coping styles of nursing students in Saudi Arabia	100 nursing students	Cross-sectional	Perceived Stress Scale, coping behaviour inventory	Assignments and workload and teachers and nursing staff	Problem-solving and staying optimistic
Joolaee et al. (2015)	Iran	Not mentioned	To explore nursing students in Iran on stress and readiness	17 nursing students	qualitative content analysis	Semi-structured interview	Rejection of the profession and fear and anxiety	Not measured
Moridi et al. (2014)	Iraq	Not mentioned	To investigate stress among students in Iraq	230 nursing students	Cross-sectional	A questionnaire developed specifically for the study	Humiliating experiences and mentor's reminder in the presence of all students	Not measured

Author	Country	Theory/Model	Aim	Sample	Design	Instrument	Stressor	Coping
Najafi Doulatabad et al. (2014)	Iran	Not mentioned	To find out stress levels of students based in Iran	300 nursing students	Cross-sectional	A questionnaire developed specifically for the study	Faculty-related factors including blaming student in the presence of others	Not measured
Rafati et al. (2017)	Iran	Lazarus and Folkman (1984)	To investigate stress levels and coping styles among Iran nursing students	20 nursing students	Graneheim and Lundman's qualitative content analysis method	Semi-structured face to face interviews	Not measured	Seeking well-being, Active confrontation with stress, mastering the mind and body and avoidance
Suresh et al. (2012)	Ireland	Not mentioned	To compare and measure stress levels among students in Ireland	120 newly qualified nurses and 128 fourth-year student nurses	Cross-sectional	The Nursing Stress Scale	Excessive workload, and difficult working relationships	Not measured
Waled et al. (2019)	Saudi Arabia	Lazarus and Folkman (1984)	To assess the levels of stress and coping extent of students	125 nursing students	Cross-sectional	Demographic variables, the Perceived Stress Scale, and the Coping Behaviour Inventory	Taking care of patients	Problem-solving approach
Yildiz Findik et al. (2015)	Lazarus and Folkman (1984)	To investigate stress levels and coping among nursing students	160 nursing students	Cross-sectional	Personal Information Form, Clinical Stress Questionnaire, and Styles of Coping Inventory.	Not mentioned	Self-confident approach
Zhao et al. (2015)	China	Lazarus and Folkman (1984)	To investigate stress and self-efficacy concept among nursing students	221 nursing students	Cross-sectional	Perceived Stress Scale, coping behaviour inventory and Generalized Self-Efficacy Scale	Assignments and workload	Transference

APPENDIX 5

Records identified through database searching: (n=1170)
- CINAHL (193)
- ERIC (44)
- MEDLINE (421)
- PSYCINFO (27)
- SCOPUS (485)

Records after duplicate removal: (n=953)

Records screened by title: (n=953)

Records excluded by title: (n=835)

Records screened by abstract: (n=118)

Records excluded by abstract: (n=78)

Full-text assessed for eligibility: (n=40)

Full-text excluded for various reasons:
- unable to retrieve full-text article (1)
- non-English language publication (4)
- non-research publication (2)
- content that did not relate to undergraduate nursing student stress and coping mechanisms during clinical education or a clinical internship that is part of the Bachelor's degree in health care program (6)

(n=13)

Research articles meeting the inclusion criteria (n=27)

Research articles excluded based on the Critical Appraisal Tool (Hawker et al., 2002)

(n=14)

Articles included in this review (n=13)

Identification

Screening

Eligibility

Included

Appendix 5. Prisma diagram from sub-study I (Article I)

APPENDIX 6.

Search terms used in the databases from sub-study I (Article I)

TITLE-ABS-KEY (stress* OR eustress* OR distress*) AND ("coping mechanism*" OR "coping
technique*" OR "support*" OR "cope" OR "coping" OR "coping strateg*" OR "response to stress*") AND ("nursing student*" OR "student nurse*" OR "undergraduate nursing student*" OR "trainee
nurse*") AND ("clinical practice*" OR "internship*" OR "clinical education") AND (LIMIT-TO (SUBJAREA , "NURS ") OR LIMIT-TO (SUBJAREA , " MEDI ") OR LIMIT-TO (SUBJAREA , " SOCI ") OR LIMIT-TO (SUBJAREA , " PSYC ") OR LIMIT-TO (SUBJAREA , " HEAL
")) AND (LIMIT-TO (DOCTYPE , "ar ")) AND (LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017)   OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007)) AND (LIMIT-TO (LANGUAGE , "English "))

HANISH BHURTUN

The aim of this study was to investigate the stress levels, stressors, and coping strategies that Finnish nursing students perceive in the clinical learning environment. First year nursing students rarely faced stress, however, in their second study year they reported moderate levels mostly from lack of professional knowledge and skills and they employed emotion-based coping strategies to alleviate such stressors. Nursing lecturers and nursing staff should acquaint their students with the foreseeable evolution of stress and coping strategies to facilitate learning.

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