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## A pathway into the profession

*The use, feasibility and outcomes of a peer learning  
intervention for nursing students and newly  
graduated nurses*

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### **Abstract**

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The overall aim of present thesis was to study the use, feasibility and outcomes of a peer learning intervention for nursing students and new graduates, including studies using a quasi-experimental (Study I and III), descriptive (Study II) and mixed-methods (Study IV) design. Data were collected using questionnaires, observations, checklists for intervention fidelity, individual interviews and group interviews. When studying peer learning outcomes among nursing students, peer learning seems to have a significant interaction effect on self-efficacy, based on a comparison of changes over time between the intervention (n=42) and comparison (n=28) groups. Studying each group separately over time, significant improvements were found in the intervention group on thirteen of the twenty variables, whereas the comparison group improved on four (Study I). Observations of how nursing students (n=16) used peer learning revealed that the student pairs collaborated to different extents and in different ways. All students were observed practicing several competencies together (Study II). Testing the peer learning model in new graduates' workplace introduction (n=10) revealed that new graduates' descriptions of peer learning were consistent with the theoretical description (Study III). Feasibility was tested in relation to compliance and acceptability, and lessons were learned. In Study IV, fidelity to the intervention was generally good. When first-line managers (n=8) described their perception of using the peer learning intervention with new graduates, predominantly positive outcomes were expressed. When examining the effect of peer learning in workplace introduction for newly graduated nurses (n=35), it was difficult to draw any conclusions due to recruitment problems (Study IV). The conclusion is that peer learning is a useful model for nursing students' that seems to improve self-efficacy more than traditional supervision does. The model gives nursing students opportunities to practice several competencies on each other, and these competencies, e.g., leadership and organizational skills are useful in their future profession. The students practice teaching and supervision skills on each other, which seems to be a natural part of the peer relationship. Peer learning in the context of new graduates' workplace introduction describes in a way consistent with the theoretical description of peer learning outcomes thus, also here it seems as a useful model. When developing and testing new interventions such as peer learning, it is important to do so systematically to minimize problems when conducting an evaluation, where the MRC framework can be useful. First-line managers generally expressed a positive attitude toward the peer learning model.

*Keywords:* Clinical practice education, Intervention, Newly graduated nurses, Nursing students, Peer learning, Workplace introduction.

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*To everyone interested*



# List of Studies

This thesis is based on the following studies, which are referred to in the text by their Roman numerals.

- I Pålsson, Y., Mårtensson, G., Swenne, C.L., Ädel, E., Engström, M. (2017) A peer learning intervention for nursing students in clinical practice education: A quasi-experimental study. *Nurse Education Today*, 51:81–87
- II Pålsson, Y., Mårtensson, G., Swenne, C.L., Mogensen, E., Engström, M. First-year nursing students' collaboration using peer learning during clinical practice education: An observational study (Submitted).
- III Pålsson, Y., Engström, M., Swenne, C.L., Mårtensson, G. (2018) A peer learning intervention targeting newly graduated nurses: A feasibility study with a descriptive design based on the Medical Research Council framework. *Journal of Advanced Nursing* 74(5):1127-1138
- IV Pålsson, Y., Engström, M., Swenne, C.L., Mårtensson, G. A peer learning intervention in workplace introduction - first-line managers' and newly graduated nurses' perspective: A mixed-methods study guided by the Medical Research Council framework (Manuscript).

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# Introduction

In everyday life, we continually learn from each other. For most of the things we need in our working (or personal) life, we receive sufficient guidance from colleagues (or friends) (1). Studies have reported on the importance of relational factors for learning in clinical practice education (2) and in facilitating transition (3–6). This thesis investigates nursing students' and newly graduated nurses' use of peer learning during their pathway into the profession. The focus is on peer learning, a model in which peers learn with and from each other while working in pairs. Peer learning permits the positive use of differences between learners, turning these differences into education opportunities (1). Learning with and from each other is described as giving peers the opportunity to collaborate, reflect and solve problems together (7,8), all useful skills in promoting learning. Having a peer is reported to build confidence (7), promote feelings of support and safety (8,9), as well as to facilitate the ability to cope with stress (4,5). All of these skills can reasonably be assumed to help nursing students and new graduates into the profession. Studies on peer learning thus far have primarily been descriptive and focused on students. There is a lack of experimental studies in the area as well as of studies on how students actually act in the collaboration during their clinical practice education, hence their clinical practice. Based on earlier studies, it would seem reasonable to assume that newly graduated nurses will experience the same peer learning benefits as nursing students. However, testing a peer learning intervention in a new context requires a systematic approach. The studies in this thesis were conducted to generate new knowledge about the usefulness of peer learning during nursing students' and newly graduated nurses' pathway into the profession.

# Background

## Challenges in healthcare

Internationally, the healthcare environment has been described as complex, challenging and stressful, including factors such as increasing patient needs and increasing use of technology and new evidence as a basis for decision-making (10). Duchscher (11) found that nursing students and newly graduated nurses (henceforth called new graduates) are entering an overloaded and understaffed healthcare system, implying that new graduates have to rapidly transition from being a nursing student to being a competent, effective practitioner. The World Health Organization (WHO) (12) reported on the global shortage of healthcare personnel, including nurses, which is described as posing the risk for a worldwide healthcare crisis. In Sweden, The National Board for Health and Welfare (13) reported that although an improved entrance of nurses can be seen, the labor market for nurses is increasingly characterized by insufficient access. The imbalance is described as being due to the need for and consumption of care, which are increasing owing to the growing population and longer life spans.

The first period for new graduates has been reported to be a vulnerable time in which they formulate decisions about their intention to stay in the profession and/or the organization (14). Reports from a Swedish longitudinal cohort study following nursing students during their education as well as their first years after graduation found increased frequency of stress symptoms (15) and levels of study burnout during the years in nursing education, predicting lower work-related preparedness in the last year. Furthermore, study exhaustion during nursing education initially influenced levels of intention to leave during the first year of employment (16).

Rebeiro et al. (17) argued that the development of nursing students' work readiness relies on the type and quality of clinical practice. Others, such as Forber et al. (18), have concluded that the employers' need for new graduates to fill a void may be symptomatic of the reality and demands of workplaces rather than of lack of readiness or deficiencies in nursing education. What is clear is that there is a need for nurses to enter as well as remain in the profession. Nursing education and healthcare employers should search for and use evidence-based models that support nursing students' and new graduates' transition into the nursing profession.

## Nursing education

Internationally, nursing is largely a regulated profession, meaning that to practice as a nurse, one needs to be licensed or registered. Each country in which nurses practice requires established standards of practice to ensure the maintenance of high-quality care, i.e., that nurses have the knowledge, skills and ability to practice in complex healthcare settings based on the best available evidence (19). In many countries, including Sweden, nursing education has been reformed from being a practical, non-academic program into a higher education program. Sweden has minimum requirements for nursing education (length as well as theoretical and clinical training) defined in the Directive 2005/36/EC (20), the goal being to facilitate nurses' mobility within the European Union (EU). Furthermore, a national framework set up by the Swedish Higher Education Authority (21,22) regulates current nursing education. Nursing education in Sweden comprises 180 credits, including theoretical as well as clinical courses and resulting in a Bachelor's degree. Swedish nursing education programs' aim is to provide students with general knowledge as well as critical thinking, problem-solving skills and independence. Furthermore, the nursing competencies needed for graduation are described in the areas: a) knowledge and understanding, b) skills and abilities and c) judgement and attitudes (21,22). In Sweden as well as internationally, universities generally have autonomy in designing their program, as long as it conforms to the national requirements and international regulations. Thus, it is possible to include local, specific learning outcomes in the theoretical and clinical parts of the program. Clinical practice is an essential part of preparing nursing students for their practice-based profession, and about half of the nursing education program is made up of clinical practice. In Sweden, the National Board of Health and Welfare regulates nursing. Initial registration as a nurse in Sweden requires successful completion of an accredited nursing program.

## Core competencies

The complexity and fast development of healthcare systems demands a high level of competence on the part of all healthcare professionals. In the US, the Faculty of Quality and Safety Education for Nurses (23) has defined quality and safety competencies for nurses. In 2015, the European Federation of Nurses Associations (EFN) (24) completed a competency framework consisting of six areas. Based on The Higher Education Ordinance (22) and the EFN Competency Framework (24), the Swedish Society of Nursing developed the "Competence requirements for registered nurses" (25). This document is described as a support for, i.e., authorizing nurses and educational institutions by clarifying the competencies of a qualified nurse. Detailed competence requirements for nurses are specified, including eight areas of

core competencies, i.e., person-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety and informatics as well as leadership and pedagogics in caring. The six first areas of core competencies described nationally are basically identical to the defined quality and safety competencies for nurses in the US (23).

## Learning in the clinical setting

Positive clinical practice experiences have been described as an significant component in the development of professional competence, nursing identity and confidence (26–28). Learning in the clinical setting was discussed by Egan and Jaye (2) as being a social process, requiring social participation. Interviews with Finnish nursing students revealed that the wide range of clinical settings, patients, staff and preceptors all influenced learning. Furthermore, the students described how they gained competence by seeking feedback from others concerning their knowledge, skills and attitudes in order to develop into a professional role (29). Reviews have reported that students' learning in clinical settings was dependent on the situations that the students encountered during their placement as well as the models of learning and supervision used. Some examples of the supervision models described are preceptor models, faculty-facilitated group models and collaborative models; within the different models there is also variation (30–32). In Sweden, traditional supervision has involved one preceptor supervising one nursing student at a time.

Reviews based on studies from different countries have reported that opportunities to develop professional competence were dependent on the quality of supervision, becoming part of the team, obtaining a real picture of nursing and being given a suitable amount of responsibility (27,33,34). Furthermore, achieving comfort, confidence and competence (34), including development of supportive relationships between students, staff and preceptors, have been described as significant factors (31,32,35).

Allan and Smith (36) argued that pedagogical concerns are not often addressed in clinical practice and that the practice period is frequently described as being organized from a trainee perspective, rather than as being an academic program (37,38). One review, including papers from the UK, reported that nursing education has been criticized for lacking learning opportunities that help students develop into independent practitioners (39). Furthermore, an Australian study found that clinical practice provided deficient opportunities to gain experience of future work requirements (40). When Spitzer and Perrenoud (41) studied Western European countries' implementation of nursing education reforms, they pointed out the importance of using clinical instruction models that prepare nursing students for self-directed learning to become life-long learners if they are to meet the needs of a rapidly changing healthcare system.

Findings from an Australian study on new graduates showed that not only clinical skills, technical knowledge and communication skills were required, but also skills in teamwork, time management, and stress management. Furthermore, the new graduates needed to learn structures, routines, and responsibilities as well as to get to know new colleagues and create collaborations (42). In one review, feedback was described as an important element of learning that helped new graduates recognize how their performance was perceived; the review also showed that if feedback was delivered in a friendly manner, this boosted their confidence (43). New graduates reported lack of sufficient feedback and support, which resulted in anxiety and reduced confidence (43,44).

Reflective practice can be used in the clinical setting to help students/new graduates make systematic sense of their experiences and become life-long learners. Reflection is described as a process of critically thinking about a clinical experience and is reported to improve knowledge, change traditions, values, and beliefs as well as to develop new understandings and transform clinical practice (45). Goulet, Larue, and Alderson (46) conducted a concept analysis of reflective practice. They concluded that the dimensions of reflective practice in clinical settings included the theory-practice gap, development, and caring. In education, the concept included the dimensions of development, deliberate review, emotions and evaluation. Gibb's reflection cycle (47), based on Kolb's (48) experiential learning theory, is designed to guide learners in developing knowhow (situated cognition), what to do (skills) and attitudes and values (ethical behavior).

## Feeling prepared or not prepared to enter the nursing profession

At the end of the nursing program, students described positive feelings such as excitement and satisfaction with their choice of profession. Furthermore, they reported feelings of being capable of moving on to the nursing profession, although they still had a great deal to learn (27,49). Studies have reported on how final-term nursing students consider themselves to be adequate prepared and ready for working life in regard to their knowledge, clinical practice skills and decision-making (27,28,50,51). In a study on Australian nursing students, reported areas of lack of confidence were caring for a large patient caseload, caring for patients with complex health needs and communicating with doctors (28). An integrative review based on studies from different countries found that not enough time was spent on practicing prioritization and organization of nursing care during nursing education (33). This corresponds to Gardulf et al.'s (51) findings that Swedish nursing students on the point of graduation self-rated competencies in leadership, deci-

sion-making as well as education and supervision of staff and students lower than competencies involving patient-related nursing.

Reviews (10,33,44) have indicated that new graduates have unrealistic expectations about nursing and their new role in providing the best patient care possible, and that these unrealistic expectations caused lack of confidence. Discrepancies between what they were taught at university and the reality of nursing, where professional and organizational constraints influence their ability to meet these expectations, result in new graduates feeling unprepared for independent professional practice (44). Commonly described experiences during the first period of new graduates' working life are feelings of anxiety and stress (10,43,44). New graduates have described experiencing their own weaknesses (43,52), heavy workload (27), increased responsibility and accountability, i.e. management and organizational skills, as well as lack of support as stressors (33,43,52). In a Swedish study on new graduates' self-assessments of their professional development, educational experiences, developing professional self-efficacy and clinical expertise were reported as important. The new graduates called for more practice experience during education as a way to manage professional work and develop practical skills (53).

## Support strategies in new graduates' workplace introduction

The need to intervene and facilitate the professional adaptation of new nurses has been recognized in studies internationally. Many hospitals offer different strategies to assist and support new graduates in their transition, and several reviews have been conducted aimed at identifying the most effective strategy. However, reviews have revealed what appears to be a lack of consensus on the elements needed (5,54,55). The support offered varies greatly in length, from less than one month to three years, and includes different elements and types of support given. Examples of elements included in a transition program are preceptor-guided clinical support, mentoring (55–58), theoretical components and lab skills (56). The conclusion of the reviews was that structured learning and support strategies do lead to improvement, though not always significant improvement, in areas such as confidence, job satisfaction as well as stress and anxiety reduction (55–57,59,60).

Multiple studies have demonstrated the importance of relational aspects in facilitating transition. A review by Van Rooyen et al. (3) found that social aspects of work and a sense of belonging, the necessity of support and a positive clinical environment were the three most important factors in facilitating new graduates' transition. Other reviews (4,5,58) have reported that new graduates who have had the opportunity to meet, socialize and share

experience in a group were better able to cope with stress. This result was confirmed by a Swedish study on new graduates, in which significantly less stress was reported by those who had received group supervision (6). In one review (61), all included articles indicated that interaction with and support from other nurses (peers, mentors and preceptors) had a positive impact on new graduates' job satisfaction. Factors identified as impairing new graduates' successful transition were limited support, experience of unprofessional workplace behaviors, full workloads and responsibilities that exceeded their proficiency (62). Parker et al. (63) reported that of 282 Australian new graduates, 32% were dissatisfied with the relationship with their preceptor and had expected to be more welcomed and receive more support. Reflection with peers (31) and a supportive peer relationship (64) have been found to be important in facilitating empowerment. When people feel empowered at work, positive individual as well as workplace outcomes are likely to occur. Furthermore, the results of a study by Peterson et al. (65), including new graduates in Canada, showed that job demands, social support (from both preceptors and coworkers) and self-efficacy were significantly related to job satisfaction.

## Peer learning

### Theory and definition

Peer learning is based on the idea that learning involves social cognition and that experience, understanding and knowledge building are shaped in interactions between humans (1). He defined peer learning as learning from and with each other, both formally and informally. According to Boud (1), peers are generally people in a similar situation who do not have a role as a teacher or expert practitioner and who do not have power over each other by virtue of their position or responsibilities. Furthermore, he claimed that peer learning is not a substitute for activities conducted by staff members, but an important addition to the repertoire of teaching and learning. Boud's (1) description of general peer learning outcomes includes: a) working with others – Feeling responsible for one's own and others' learning and development of collaborative skills, b) critical enquiry and reflection – Discussing existing ways of thinking and reassessing views, c) communication and articulation of knowledge, understanding and skills – Developing through testing ideas on others, d) managing learning and how to learn – Cooperating and working out how to tackle tasks, identifying learning needs and planning how to address these, and e) self and peer assessment – Giving and receiving feedback on one's work and having a circumstance where one can compare oneself to others.

The assumption underlying peer learning is a socio-cultural understanding of the relationship between knowledge, individuals and their environment. Bandura's (66) Social Cognitive Theory posits that people learn from one another through observation, imitation, and modeling. He considered that a vast amount of social learning occurs among peers. Social learning theory explains human behavior in terms of a continuous reciprocal interaction between cognitive, behavioral, and environmental influences. He also described how behavioral, cognitive and other personal factors as well as environmental events influence each other in a bidirectional manner. Self-efficacy is a central concept in social cognitive theory, and greater self-efficacy is thought to facilitate actions and behaviors such as decision-making. Self-efficacy can be described as an individual's belief in his/her own ability to succeed in a prospective situation. An individual with high self-efficacy is more likely to view certain tasks as something to be controlled rather than as something to be avoided (67).

The social theory of learning called 'Communities of Practice' (CoP) (68) takes an integrated approach to learning, which is achieved through a mixture of social engagement and collaborative work in a practice environment. A CoP is described as a small group or pair of individuals who share a concern and who gain knowledge, learn professional skills and develop a professional identity through interaction. Being part of a CoP includes sharing information, understanding, and advice. They solve problems, explore ideas together and bounce ideas off each other; they help one another and discuss situations, goals, and needs.

A number of different forms of peer interactions have been described in the research; these include peer tutoring, peer teaching and peer mentorship (69) as well as peer-assisted learning (70). Furthermore, cooperative learning, collaborative learning (70–72) and 2:1 or 1:2 learning (72) have been used, all of which involve small groups or paired learning. According to Topping (73), there is a lack of clarity, no generally accepted scientific position, and sometimes terms are used synonymously. Overall, collaborative learning has been described as an umbrella term, and the differences between the forms of peer interaction lie in the degree of structuring proposed by teachers as well as the equality and mutuality in the pair.

In the present thesis, peer learning is defined as a relationship with a peer (paired), who is enrolled in the same course or starting the introduction at the same time and with whom one shares a preceptor in the clinical setting.

## Reviews on collaborative leaning models during clinical practice

Reviews, based on studies from different countries (Table 1), targeting healthcare students using different peer interaction models during clinical practice have described positive effects, such as improved cognitive skills



(69,74), cooperative skills (69,72), confidence and clinical skills (69,74,75). Furthermore, less dependence on the preceptor has been reported (69,72,74).

Learning opportunities with a peer were reported to involve increased opportunities to access and become involved in learning activities (74,75), but also decreased opportunities because rare resources are shared with the peer. Students have described disadvantages in the form of incompatibility, negative competition (69,72,74) and comparisons in the pair made by preceptors (72) as well as insufficient time for preceptors to provide students with individual supervision and feedback (74).

Table 1. A brief description of review studies on healthcare students using peer interaction during clinical practice.

Author Year	Title	Students	Country of origin	Student outcomes Advantages	Student outcomes Disadvantages
<b>Baldry Currrens J. (72) 2003</b>	The 2:1 Clinical Placement Model: Review	Physiotherapy	Canada 5 US 2 UK 2 Australia	Increased learning Improved clinical competence Peer support Feeling autonomy Improved teamwork skills	Not compatible/personal conflict Negative competition Sharing rare resources Overshadowing/inhibition May not be seen as individuals
<b>Briffa G and Porter J. (74) 2013</b>	A systematic review of the collaborative clinical education model to inform speech-language pathology practice	Speech-language pathology	UK 6 Canada 5 Australia 3 US 2 Israel	Improved clinical competence Improved clinical reasoning Increased confidence Improved learning environment Feeling autonomy	Not compatible Negative competition Sharing rare resources Insufficient time for individual supervision and support
<b>Carey, M.C., Kent, B., Latour, J.M. (75) 2018</b>	Experiences of undergraduate nursing students in peer assisted learning in clinical practice.	Nursing	US 4 UK 3 Iran	Improved clinical competence Increased confidence Improved learning environment Peer support and feedback Reduced stress and anxiety	
<b>Secomb, J. (69) 2008</b>	A systematic review of peer teaching and learning in clinical education	Health sciences	UK 4 US 4 Canada 2 Australia South Africa	Increased learning Improved clinical competence Improved clinical reasoning Increased confidence Improved collaboration skills Feeling autonomy	Not compatible due to: Level of knowledge Education level Incompatible personalities Negative competition Decreased learning opportunities
<b>Sevenhuysen, S., Thorpe, J., Molloy, E., Keating, J., Haines, T. (70) 2017.</b>	Peer-assisted learning in education of allied health professional students in the clinical setting: A systematic review.	Allied health professions	Not described	Increased learning Feeling autonomy Improved teamwork skills Peer feedback Improved self-reflection	Not compatible/personal conflict Sharing rare resources

## Peer learning during students clinical practice

Empirical studies found, reporting on healthcare students, enrolled in the same course and using peer learning (working in pairs) during clinical practice were relatively rare. The studies have targeted different healthcare students and used both qualitative and quantitative methods. Five studies were conducted in Sweden (7,9,76–78), and four in the UK (79–82). Furthermore, three studies were conducted in Canada (8,83,84), two in the US (85,86), one in Australia (87) and one in Ireland (88). Eight of the studies targeted nursing students (7–9,76–78,85,86). Furthermore, four focused on physiotherapy students (79,82,84,87), three on occupational therapy students (80,81,83) and one on both physiotherapy and occupational therapy students (88). Nine studies used interviews (7,8,76,77,80,82,85,86,88) to collect data, six used a questionnaire (9,78,81,83,84,87) and one used both interviews and a questionnaire (79). Results from the articles found are described under the headings ‘How peers learn together and being supervised,’ ‘Giving each other emotional support’ and ‘Peers developing professional skills together.’

### **How peers learn together and being supervised**

Nursing students reported improved learning through sharing experiences (7–9,81,85), discussing, bouncing ideas off each other and reflecting together (8,9,79,80,82,83,86,88). Sharing experiences, such as perceiving things differently, was described as enriching their learning and leading to new ways of thinking (86). Some students experienced a sense of competition when negotiating tasks or for the preceptors’ attention and, thus, missed opportunities for learning (9,79,81,83,85,86,88). Competition was expressed as stressful when a student felt less proficient than his /her peer (9,83). Competition in the pair was also described as triggering students’ performance when they compared themselves with each other (9,79,83).

When Ladyshewsky et al. (87) evaluated the learning process of two clinical practice models, students rated peer learning slightly more favorably than traditional learning, whereas preceptors rated traditional supervision slightly more favorably. Interviews with preceptors who supervised students using peer learning described how they bounce ideas back and forth with the pair and give permission to practice. Furthermore, preceptors have reported trying to restrain themselves from intervening too quickly (77) and stated that by taking a step back and studying students’ interaction, they gain insight into students’ learning process and knowledge (76). The preceptors found it challenging when the two peers were incompatible and very unequal in their level of knowledge (77); this has also been described by students (79,83,85).

### **Giving each other emotional support**

Students stated that peer learning includes working together and supporting each other, emotionally and physically, which reduced anxiety (8,9,80,81,85,86). They felt safer and less nervous being with a peer when they were introduced to the staff and faced new clinical challenges (8,9,86). When they felt insecure, they discussed problems with their peer that they might not have wanted to discuss with their preceptor (7,9,79). Asking one's peer 'stupid' questions was experienced as less stressful, because they had a shared understanding of being a student in clinical situations (8,9). Feeling supported and working with a peer were also described as improving students' confidence (7,80,85,86). Furthermore, student pairs described how they gave each other feedback. Students sometimes described feeling uncomfortable about giving feedback to their fellow student. Nevertheless, both students and preceptors experienced that positive feedback between peers' increased feelings of confidence (8).

### **Peers developing professional skills together**

Descriptions of students practicing clinical skills together have been reported (80,83). Students experienced that they developed collaboration skills together (7,8) and peer learning was described as giving them an opportunity to be included in the team (79,86). Furthermore, students reported feeling more independent (7,76,79,83) and assume more responsibility (7,86). This is consistent with a recent study comparing peer learning and traditional supervision of nursing students, which showed that the peer learning group self-rated their professional progress significant higher compared to students supervised in the traditional manner (78). However, in Martin and Edwards' (81) study, students reported having less opportunity to be independent when using peer learning, which can be related to studies describing the importance of balancing between collaboration and independence to promote learning (8). Stenberg and Carlson (9) found that nursing students' evaluations of the peer learning model were generally positive. The highest mean value was for the question about whether the peer learning activities were relevant to their future profession. Additionally, DeClute et al. (84) found statistically higher scores for all measured clinical competence in the peer learning group compared to traditional supervision.

To sum up, when nursing students and preceptors described peer learning, several benefits emerged, including learning and development of skills such as cooperation, caring and reflection. Furthermore, nursing students reported decreased stress and anxiety, increased confidence and feeling supported. No studies have been found on pairs of new graduates supporting and learning with and from each other in their workplace introduction. However, new graduates who have the opportunity to meet, socialize and share experiences in a group reported improving each other's ability to cope with stress

(4,5,58). Thus, it seems reasonable to suppose that new graduates would experience similar positive aspects of peer learning, as described in earlier studies with students.

Based on the literature the program logic assumption underlying the peer learning intervention in present thesis, were that use of the model would encourage students/new graduates to help each other learn and to support each other when learning. This, in turn, should improve nursing students'/new graduates' learning and development as well as their belief in themselves and, thereby, their well-being and satisfaction (Figure 1).

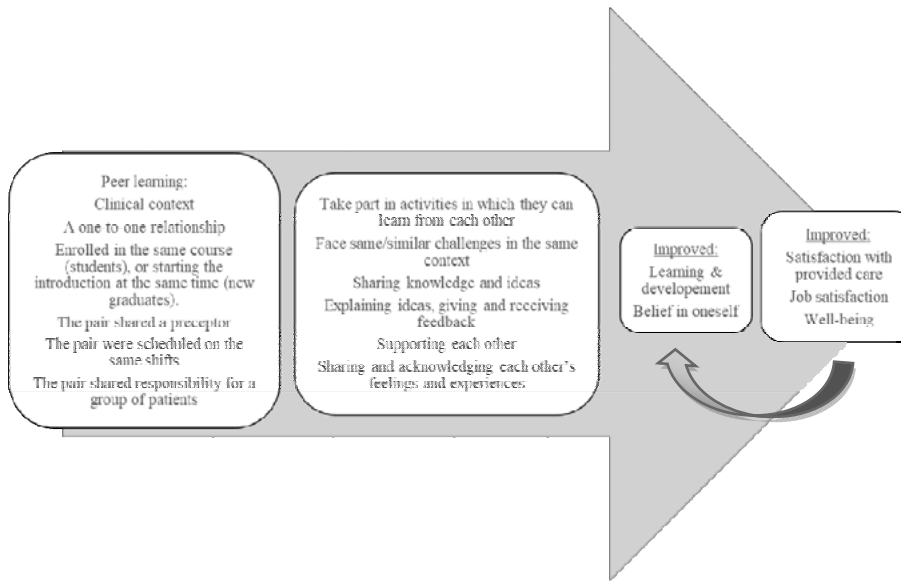


Figure 1. Program logic assumption for the peer learning intervention among nursing students and new graduates in the present thesis.

## The Medical Research Council framework

When using a peer learning intervention in a new context, i.e. new graduates' workplace introduction, the intervention needs to be systematically developed and tested to ensure that the complex intervention is understood and to optimize its design. In 2000, the UK Medical Research Council (MRC) developed a framework for the development and evaluation of complex interventions offering methodological guidance; an updated version came in 2008 (89). The MRC framework includes methodological recommendations for the development, feasibility and piloting, evaluation, and long-term implementation of complex interventions. Complex interventions are commonly used in, for example, healthcare and education. The majority of interventions in nursing and medicine are complex in nature and involve a

number of components. A complex intervention is defined as an activity that contains various interacting components, which when used toward the intended objective produce a range of possible and varying outcomes (89). The MRC highlighted the importance of developing and evaluating interventions systematically, using the best available evidence and appropriate methods. Furthermore, complex intervention should be tested using a carefully phased approach, starting with a series of pilot studies targeting each of the key uncertainties in the design, and moving on to an exploratory and then a definitive evaluation. Four interactive stages were described in the development-evaluation-implementation process, i.e., development, feasibility/piloting, evaluation and implementation. In the development stage, the main elements were to: a) identify the evidence base, b) identify/develop theory and c) model the process and outcomes. The feasibility/piloting stage included elements of: a) testing procedures, b) estimating recruitment /retention and c) determining sample size. In the third stage, evaluation, the described main elements were: a) assessing effectiveness, b) understanding change processes and c) assessing cost-effectiveness. The fourth and last stage was the implementation phase, including: a) spreading, b) surveillance and monitoring and c) long-term follow-up. In all stages, the researcher should be intent on addressing the main uncertainties in the intervention, design, method or procedure so as to produce solid evidence (89). When evaluating a complex intervention, one important question is whether the intervention is effective in daily practice. Process evaluations can be used in all stages of developing and evaluating interventions, the goal being to understand how the intervention works in practice and the causal assumptions supporting it. At the pilot/feasibility stage, process evaluation can be used to understand the compliance and acceptability of the intervention and to optimize its design and future full-scale evaluation form. The MRC reported that a mixture of quantitative and qualitative methods is probably needed to answer uncertainties (89,90).

To sum up, complex interventions are commonly used in, e.g., healthcare and education. Workplace introduction itself is complex, with a diversity of factors affecting whether the result will be mainly a positive or negative experience. The peer learning intervention consisted of several components, and adding peer learning into the existing introduction program affected, e.g., the new graduates, first-line managers, preceptors, and colleagues, such as other nurses and nurse assistants. The intervention could also elicit several different outcomes. When developing and evaluating complex interventions, it is important to proceed systematically, and in this connection the MRC framework can offer methodological guidance. In the present thesis, the MRC framework guided *Study III* and *IV*.

# Rationale

Both nursing students during their clinical practice and new graduates during their transition experience these as challenging periods, associated with feelings of stress, describing support as decreasing stress and helping them find space for learning. Clinical models that prepare nursing students and new graduates to master their future profession need to be developed and studied. Studies on peer learning thus far have primarily been descriptive and focused on students; have described the model as having several benefits. Interview studies do reveal knowledge about students' experiences, but it is still unclear which effects peer learning has on nursing students performance as well as how students act in the actual collaboration when using peer learning during their clinical practice. Based on earlier studies, it seems reasonable to assume that newly graduated nurses would experience the same peer learning benefits as students do. New graduates, who have the opportunity to meet, socialize and share experience in groups during their transition, have been reported to improve each other's ability to cope with stress. Using the resource of peers as a supplement to the existing work introduction program could be beneficial for new graduates. However, testing a peer learning intervention in a new context requires use of a systematic approach, thus allowing the complex peer learning intervention to be understood and its design to be optimized.

# Aims

The overall aim of this thesis was to study the use, feasibility and outcomes of peer learning intervention for nursing students and new graduates. The specific aims of the included studies were:

- I To investigate the effects of peer learning in clinical practice education on nursing students' self-rated performance.

The hypothesis was that nursing students who are given the opportunity to learn with a peer during their clinical practice education would improve significantly, from baseline to follow-up, regarding their critical thinking, collaborative behavior as well as learning and development. Further, the hypothesis included that they would rate greater satisfaction with provided care, perceived self-efficacy, psychological empowerment and access to structural empowerment over time. It also included that students using peer learning would improve more over time compared with nursing students receiving traditional supervision.

- II To describe the collaboration between first-year nursing students using peer learning during their first clinical practice education.

- III To describe the feasibility of a peer learning intervention targeting new graduated nurses. Feasibility was tested concerning the consistency of the theoretical description of peer learning with empirical findings in a new context, compliance, and acceptability, as well as usability of a questionnaire measuring the intended future outcome variables.

- IV The study aim was twofold: (1) to investigate study process in terms of (a) first-line managers' perspective on the intervention study, difficulties they face and how they handle these and (b) new graduates fidelity to the intervention; (2) to examine the effect of the peer learning intervention in workplace introduction for newly graduated nurses.



The hypothesis was that newly graduated nurses who were given the opportunity to learn the profession with a peer would improve significantly more over time regarding self-rated ability to perform nursing-specific tasks and competences (self-efficacy), learning and development (thriving) than would new graduates in a control group who were introduced to the profession in the traditional manner. Further, the hypothesis included that the newly graduated nurses exposed to peer learning would perceive greater psychological empowerment, well-being, job satisfaction, satisfaction with given care and less stress/demands.

# Methods

## Design

To study the use, feasibility and outcomes of peer learning for nursing students and new graduates, different quantitative and qualitative approaches were included.

In *Study I*, a quasi-experimental design was used to study the effects of peer learning on nursing students' self-rated performance.

*Study II* was intended to get a better understanding of the findings from Study I. Thus, a descriptive observational study was conducted aimed at investigating nursing students' use of peer learning in a real-life context.

In *Study III*, a peer learning intervention in the context of new graduates' workplace introduction was developed, based on results from Study I and earlier studies. The intervention's feasibility was tested based on the MRC framework, using a quasi-experimental design with descriptive methods.

*Study IV* was based on the results from Study III and included a mixed-methods approach with process evaluation and a randomized controlled trial (RCT). The process evaluation was conducted over time and like the previous study guided by the MRC framework, using descriptive data from first-line managers and new graduates. The RCT targeted newly graduated nurses. Block-randomization to the intervention or control group was used.

In all studies, participants were followed over time. In *Study I* and *II*, nursing students were followed for two weeks, and in *Study III* and *IV*, new graduates were followed for three months. An overview of the included studies is presented in Table 2.

Table 2. *Study design, sample, data collection and data analysis of the studies included in the thesis.*

Study	Design	Sample	Data collection	Analysis
I	Quasi-experimental with an intervention and comparison group	70 nursing students, intervention group (n=42), comparison group (n=28)	Questionnaires	Wilcoxon signed rank test Mann-Whitney <i>U</i> test Chi <sup>2</sup>
II	Descriptive	16 nursing students (8 pairs)	Observations	Qualitative content analysis

III	Quasi-experimental with an intervention group only. The group was followed over time using descriptive methods.	10 new graduates (5 pairs)	Repeated interviews Checklist for intervention fidelity Questionnaires	Deductive qualitative content analysis using Boud's (1) theoretical descriptions of peer learning Descriptive statistics
IV	Descriptive and experimental with an intervention and control group	8 first-line managers 35 new graduates, intervention group (n=21), control group (n=14)	Group interviews Checklist for intervention fidelity Questionnaires	Qualitative content analysis Generalized estimating equations (GEE)

## Settings

In *all* of the included studies, the setting was medical, surgical or orthopedic wards. The environment includes several categories of staff, shift changes and patients with complex medical and nursing needs. Information on the number of participating hospitals and wards is provided in Table 3. In *Study I*, eight of the participating 22 wards used peer learning.

Table 3. *Information on the number of participating hospitals and wards in the studies included in the thesis.*

	<i>Study I</i> Nursing students n=70	<i>Study II</i> Nursing students n=16	<i>Study III</i> New graduates n=10	<i>Study IV</i> New graduates n=35	<i>Study IV</i> First-line managers n=8
<b>Participating:</b>					
Hospitals	3 hospitals	1 hospital	3 hospitals	3 hospitals	2 hospitals
Medical	14 wards	1 ward, 4 pairs	3 wards, 3 pairs	5 wards	4 wards, 4 FLMs
Surgical	5 wards	1 ward, 2 pairs	2 wards, 2 pairs	3 wards	2 wards, 2 FLMs
Orthopedic	2 wards	1 ward, 2 pairs		2 wards	1 ward, 2 FLMs

FLM = first-line managers

During the clinical education practice (*Study I* and *II*), the students were supported, in addition to the preceptor, by a clinical lecturer responsible for the nursing students' learning outcomes as well as to help solve any problems that might occur with a student or pair of students. The clinical lecturer visited the ward several times a week, and in cooperation with the student and preceptor, assessed whether the student had achieved the learning outcomes. The university sets the learning outcomes nursing students are to achieve during their clinical practice. During this first clinical practice period, the learning outcomes were as follows: 1) Identify essential aspects of interpersonal encounters, reflect on, and relate these aspects to theoretical knowledge. 2) Using a critical and professional approach, assess, plan, accomplish and evaluate patients' fundamental care needs. 3) Apply safety

precautions in nursing. To achieve these learning outcomes, the students were also supposed to formulate their individual learning outcomes.

## Study I

### Participants

The participants were undergraduate nursing students attending their first clinical practice. The students were in their second semester of a 3-year Bachelor of nursing program. All students (n = 87) were invited to participate. Of the eligible 87 students, two were absent at the time of baseline data collection, and of the remaining 85, 82% (n=70) completed the questionnaires at both baseline and follow-up: 42 of 46 in the intervention group and 28 of 39 in the comparison group. The demographic characteristics of the participants are presented in Table 4.

Table 4. *Demographic characteristics of the nursing students in Study I and II and new graduates in Study III and IV.*

	<i>Study I</i> Both groups (n=70)	<i>Study II</i> (n=16)	<i>Study III</i> (n=10)	<i>Study IV</i> Both groups (n=35)
<b>Age</b>	19-48	20-44	22-41	21-47
Mean	25.3	26.5	29.9	27,4
Median	23	25	28	26
<b>Gender</b>				
Female	67	14	9	31
Male	3	2	1	4
<b><sup>a</sup> Worked in healthcare before the nursing program</b>				
Yes	32	13	4	22
No	38	3	4	12

<sup>a</sup> When the sum is less than the total number of participants there are internal missing data

Regarding demographic characteristics in *Study I* and *IV*, there were no statistically significant differences between the intervention and the comparison/control group. Furthermore, there were no statistically significant differences between the participants and dropouts.

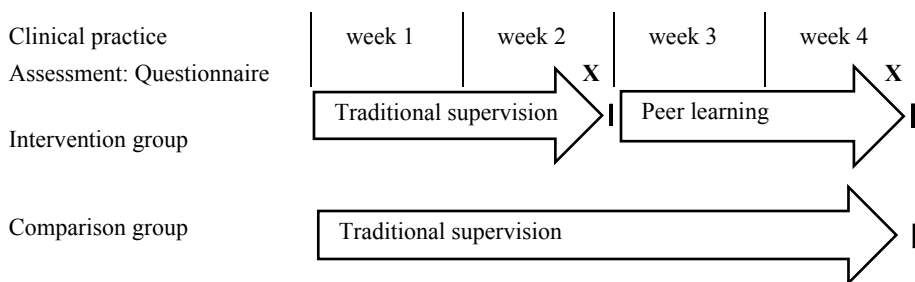
### The peer learning model in clinical practice (Study I and II)

In *Study I*, all nursing students received traditional supervision during the placement's first two weeks, meaning that one preceptor supervised one nursing student at a time. The last two weeks of clinical practice, students in the intervention group received peer learning and the comparison group continued with traditional supervision (Figure 2).

The peer learning model used in clinical practice included nursing students who were enrolled in the same course and haphazardly paired together. The two students in the pair were scheduled on the same shifts, shared responsibility for a group of patients and were supervised by one preceptor. Students supported each other and learned with and from each other. In peer learning, the preceptor's role was more unobtrusive, involving supporting students in their learning process, reflecting and giving them feedback, whereas in traditional supervision, the preceptor played an active role as a clinical educator. In both models, the preceptors were registered nurses working on the medical, surgical or orthopedic ward. The preceptor's role includes supporting students in the learning process and ensuring patient safety. The peer learning model was implemented in collaboration between the county councils and the university.

## Data collection

The procedure included the research group inviting the nursing students to participate in the study. Data were collected using questionnaires in February and March 2014, respectively. Baseline data were collected during the students' second week of clinical practice, after all participants had received traditional supervision. Thereafter, the participants were either assigned to peer learning (intervention group) or continued in the traditional manner (comparison group). Students were divided into different groups in accordance with the university's procedures, without involvement from the research group. The follow-up data were collected two weeks after baseline, at the end of the clinical practice period (Figure 2).



*Figure 2.* Overview of the design in **Study I**, with baseline assessments, intervention and follow-up assessments in the intervention and comparison group.  
x = Data collection

The students received the questionnaire after a seminar and had the option of completing it at home or directly on site. Those who completed the questionnaire at home were given a stamped reply envelope, addressed to YP. The students answering the questionnaire on-site were given a blank envelope to put the questionnaire in, and a box was available where the students

could place their envelope. The questionnaire outcome variables measured learning and development, belief in oneself and satisfaction with provided care. Nine instruments were used, eight for the primary outcomes and one for the secondary outcome. The questionnaire outcome variables are described in text on page 39 as well in Table 6. In addition, the questionnaire included demographic information shown in Table 4. The questionnaire took approximately 30 to 40 minutes to complete. One reminder was sent out by text message.

## Data analysis

Statistical analyses were conducted using IBM SPSS Statistics, version 22.0. The majority of factors did not have a normal distribution, therefore non-parametric statistics such as the Wilcoxon signed rank test and the Mann-Whitney U-test were used to analyze differences within (over time) the groups as well as differences over time between the groups. The Mann-Whitney U-test was used to compare baseline measurement factors between groups. Independent samples t-tests and Chi2 were used when comparing baseline characteristics between intervention and comparison group. The level for statistical significance was set at  $p \leq 0.05$  (two-tailed).

## Study II

### Participants

The participants were undergraduate nursing students attending their first clinical practice. The students were in their second semester of a 3-year Bachelor of nursing program. The participating hospital wards were selected using purposive sampling. Different specialties and organizations, i.e. person-centered care, care teams and working in pairs (nurse and nurse assistant), were included. Eight pairs ( $n=16$ ) were invited to participate in the study, all of which accepted. The demographic characteristics of the participants are presented in Table 4.

### Data collection

Repeated unstructured observations were carried out, including informal conversations. The observations were conducted from September 2015 to March 2016 during the students' last two weeks of a 4-week-long clinical practice. Situations in which the peers were collaborating were written down, noting what happened, which individuals were involved and in what situation (91). Informal conversations with the students (noted and recorded) were used to follow up questions that arose during the observations. The

eight student pairs were observed for a total of 164 hours, divided into 32 occasions lasting between 2 hours 45 minutes and 7.5 hours (median 5 hours and 15 minutes). Each pair was observed on three to five occasions during the two weeks. When the observer took a break as well as after the observation, an extended description of the observation was written down. The observer participated in social situations, but played a peripheral role, striving for a low level of interaction; if addressed, she referred to the preceptor. To develop ideas about how to carry out the observations and conversations as well as to synchronize what was observed, two members of the research group (YP and ME) conducted the first two data collection occasions together. YP, who had worked as a nurse and clinical lecturer and was familiar with clinical practice, but was not involved in the participants' education, conducted the remaining observations.

## Data analysis

The data were analyzed using qualitative content analysis, which systematically analyses verbal and written communication. The inductive approach looks for similarities and differences, and search for patterns in the data. The findings can be described on various levels of abstraction and interpretation (92) and emerge through the researcher's interaction with the data (93). The written observations and notes from informal and recorded conversations were analyzed using inductive qualitative content analysis inspired by Graneheim and Lundman (94). The observations and audio-recorded conversations were transcribed verbatim and checked for accuracy. All text was read through several times to ensure understanding of and familiarity with the text. Meaning units corresponding to the study aim were identified, coded and sorted. YP performed the identifying, coding and sorting of meaning units in a dialogue with ME. The sorted codes were inductively abstracted into categories and a theme.

## Study III

### Participants

The inclusion criterion was that the pair of new graduates started their workplace introduction at the same time. Furthermore, the new graduates were being introduced, for the first time, to the nursing profession. A convenience sample of six pairs of new graduates (n=12) was included. One pair dropped out and, thus, the results are based on five pairs (n=10). The participants had completed their Bachelor of nursing degree at three different Swedish universities. The demographic characteristics of the participants are presented in Table 4.

## The peer learning intervention in Study III

To develop the intervention, a steering group was established including first-line managers familiar with peer learning in nursing students' clinical education and the research group. The peer learning model used in workplace introduction included two new graduates starting their workplace introduction together, being paired together. For the first three weeks of introduction, the pair worked the same shifts, had joint responsibility for a group of patients and shared one preceptor. The pair of new graduates' preceptors were registered nurses working on the ward and chosen by the first-line manager. The preceptor provided support and feedback when needed, but in contrast to traditional workplace introduction, the preceptors' role was more unobtrusive, not actively intervening in nursing activities. The new graduates engaged in daily joint reflection. During intervention week four to six, the pair was scheduled on the same shift three times a week and had joint reflection twice a week. The pair's joint reflection continued three times a week during intervention week seven to twelve. The intervention period lasted for three months.

## Data collection

The procedure involved the first-line managers recruiting pairs of new graduates who started their workplace introduction at the same time. YP invited them to participate in the study. The study included repeated semi-structured interviews, a checklist for fidelity and questionnaires (Figure 3). Data were collected during the period January to March 2015.

Intervention week	1	2	3	4	5	6	7	8	9	10	11	12
Intervention	—————→											
Assessment <i>Study III</i> :												
Interviews	x		x			x			x			x
Checklist for fidelity	x	x	x		x	x						
Questionnaire	x		x			x						x

Figure 3. Overview of the assessments in *Study III*.

x = Data collection

Individual interviews were used to study new graduates' experience of the peer learning intervention. For first four interviews (out of five), the same interview guide was used, including questions about the participants' experience of having their introduction with a peer, how they worked together and situations that had worked out well/less well. The last interviews covered questions about the participants' experience of the intervention and their first time in the profession. YP, who conducted all of the interviews, used probing questions to achieve more depth in the topics (93). The interviews lasted between 10 minutes and 41 minutes (median 17 minutes). All participants



choose their respective workplaces as the location for the interviews. After 6 weeks, one participant dropped out of data collection due to lack of time, however the two interviews that had already been conducted were included after approval, resulting in a total of 47 interviews.

In order to describe the new graduates' compliance with the intervention, a checklist for fidelity was developed (90) covering questions related to the intervention components. YP requested a fidelity check on five occasions.

A questionnaire was tested (Table 6) regarding whether the outcome variables changed over time and what changes that occurred. The questionnaire was distributed on four occasions. Seven participants completed the questionnaire on all four occasions and were included in the data analysis. One participant completed the questionnaire on two occasions: the third and fourth. Two participants did not complete any of the questionnaires.

## Data analysis

The interviews were analyzed using a deductive content analysis (95) to identify whether the new graduates' descriptions of peer learning were in accordance with the theoretical description of peer learning. In deductive content analysis, the data are analyzed according to an existing explanatory model (93). The interviews were transcribed verbatim and checked for accuracy. All text was read through several times to ensure understanding of and familiarity with the text. A structured categorization matrix was developed, inspired by Boud's (1) descriptions of peer learning. The matrix consisted of five categories, although two of the categories were difficult to distinguish clearly in the transcriptions and were grouped together and renamed, reducing the number of categories to four (Table 8). Meaning units corresponding to the study aim were identified, condensed, coded and sorted into relevant categories in the matrix. Two members of the research group (YP and GM) performed the identifying, coding and sorting of meaning units in dialogue.

To assess the pair of new graduates' compliance with and acceptability of the peer learning intervention, data from the checklist of intervention fidelity and descriptions from the interviews were used and described in running text.

Data from the questionnaire were analyzed descriptively, using IBM SPSS Statistics, version 22.0.

## Study IV

### Participants

#### **First-line managers**

First-line managers are important in the process of testing new aspects of new graduates' introduction, as it is they who recruit and hire the new graduates for the wards and who are responsible for their personnel's workplace introduction. The inclusion criteria included that they had received information about the study and agreed to participate in the study as soon as they hired a pair of new graduates who were to begin their workplace introduction at the same time. Eight first-line managers were divided, and interviewed in groups based on whether they had used the intervention (five first-line managers) or not (three first-line managers). The participants, all females, worked on seven different wards at two different hospitals, including twelve to 28 care facilities, and had worked as first-line managers between two months and 31 years.

#### **New graduates**

The procedure included the first-line managers recruiting pairs of new graduates who were to start their workplace introduction at the same time. All new graduates who met the inclusion criterion and were employed at any one of the 22 medical or surgical wards in the region were invited to participate in the study. The randomization procedure involved: a) first-line managers informed the first author when they had a pair of new graduates starting their workplace introduction at the same time; b) the pairs were block-randomized into intervention or control group using ten sealed envelopes containing five questionnaires marked with intervention and five with traditional. The research group did not know the envelopes order. Once YP had been informed that a pair of new graduates could be included in the study, she opened the envelope at the top of the pile. The first-line manager informed the new graduates about their intended workplace introduction, and YP invited the pairs to participate in the study.

Of the eligible 44 new graduates, 80% (n=35) completed the first questionnaire, 21 of 24 in the intervention group and 14 of 20 in the control group. The new graduates' demographic characteristics are reported in Table 4, and the reasons why participants were lost to baseline are presented in Table 5. Regarding demographic characteristics, there were no statistically significant differences between the intervention and the control group. The estimated sample size to be recruited was 152 participants (76 pairs). In the region, about 220 nurses graduated from the nearby university annually. During the recruitment of participants, i.e., between June 2015 and June 2018, 338 nurses were employed at the 22 eligible hospital wards.

Table 5. *Reasons why participants were lost to baseline in Study IV.*

	Intervention group	Control group	Total
Randomized	24	20	44
Did not start the employment	1	1	42
The peer did not start the employment	1		41
Declined to participate in the study		3	38
Did not answer to baseline questionnaire	1	2	35

## The peer learning intervention in Study IV

To develop the intervention, a steering group was established consisting of first-line managers familiar with peer learning in nursing students' clinical education and the research group. The peer learning model used in workplace introduction included two new graduates starting their workplace introduction together, being paired together. During the first two weeks of introduction, the pair worked the same shifts, had joint responsibility for a group of patients and shared one preceptor. The pair of new graduates' preceptors were registered nurses working on the ward and chosen by the first-line manager. The preceptor provided support and feedback when needed, but in contrast to traditional workplace introduction, the preceptors' role was more unobtrusive, not actively intervening in nursing activities. During week three of the intervention, the pair continued to work the same shifts, but in contrast to week one and two, they were solely responsible for a care team located next to each other. Throughout the first three weeks, the new graduates engaged in daily joint reflection. During the intervention weeks four to six, the pair was scheduled on the same shift and engaged in joint, scheduled reflection twice a week. To support the reflection process, the pairs were allocated a reflection card based on Gibb's reflection cycle (47). The pair's joint reflection continued twice a week during weeks seven to twelve of the intervention. The intervention period lasted for three months.

The control group was introduced into the profession in the traditional manner, which involves one preceptor supervising one new graduate at a time and them working alongside each other for two to four weeks.

## Data collection

The study included a process evaluation containing of semi-structured group interviews, checklists for fidelity, and an RCT containing of a questionnaire (Figure 4).

Intervention week	1	2	3	4	5	6	7	8	9	10	11	12
Intervention	—————▶											
Assessment <i>Study IV</i> :												
<i>Checklist for fidelity</i>	x	x	x		x		x			x		x
<i>Questionnaire</i>	x		x			x						x

Figure 4. Overview of the assessments in *Study IV*.

x = Data collection

### Process evaluation

Group interviews were used to study first-line managers’ experience of the peer learning intervention. An interview guide was developed inspired by Krueger (96) covering opening questions, introductory questions, transition questions, key questions and ending questions. The opening questions were used to get everyone to talk, whereas introductory questions introduced the topic to be discussed. The transition questions moved the discussion toward the key questions. The key questions covered the participants’ experience of the peer learning intervention, factors facilitating and hindering intervention success as well as positive and negative outcomes for the new graduates due to the intervention. Lastly, ending questions brought closure to the discussion and enabled participants to reflect on earlier comments. The interviews lasted between 39 minutes and 43 minutes (median 41 minutes). Data were collected during winter 2017-2018 by one member of the research group (GM).

A checklist for fidelity was used, covering questions related to the intervention components. YP requested the fidelity check on seven occasions (Figure 4).

### RCT

To study the effects of the peer learning intervention, a questionnaire was used consisting of ten instruments (p 38 and Table 6). In addition, the questionnaire included demographic information shown in Table 4. The questionnaire was distributed on four occasions and took approximately 30 to 40 minutes to complete. Two reminders were sent out. Data were collected during the period June 2015 to January 2018.

### Questionnaire outcome variables (Study I, III and IV)

The questionnaire outcome variables measure learning and development, belief in oneself, satisfaction and well-being perspectives (Table 6).

Table 6. *The questionnaires' variables and instruments used in Study I, III and IV.*

Primary outcome Instrument	Used in study I	Used in study III and IV
<b>Learning and development</b>		
Critical Thinking Likert Scale (CTLS) (97)	x	
Collaborative Behavior Scale Shortened (CBSS) (98)	x	
Thriving scale (99)	x	x
Perception of overall learning outcomes (100)	x	
<b>Belief in oneself</b>		
Nursing Self-Efficacy scale (NSE) (101)	x	x
Prepared to cope with work as a nurse (single-item question) (102)	x	x
Spreitzer's empowerment scale (103)	x	x
<b>Satisfaction</b>		
Nurse-specific Satisfaction with Care (NSC) (104)	x	x
The Job Satisfaction Questionnaire (105)		x
Brief Index of Affective Job Satisfaction (BIAJS) (106)		x
<b>Well-being</b>		
WHO-Five Well-being Index (WHO-5) (107)		x
Specific Job Demands within the Healthcare sector scale (SJDH – scale) (108)		x
Psychosomatic health aspects (109)		x
Secondary outcome Instrument	Used in study I	
Conditions of Work Effectiveness Questionnaire –II (CWEQ-II) (110,111)	x	

## Primary outcome measures

### *Learning and development*

The **Critical Thinking Likert Scale** (CTLS) (97) includes ten items measured on a 6-point scale, where higher scores indicate a higher personal aptitude for and attitude toward critical thinking. The CTLS was translated into Swedish by the research group, and a bilingual translator carried out a back-translation (112). A factor analysis of the CTLS using principal component analysis revealed two factors with eigenvalues over one, explaining 63.4% of the total variance (unpublished data for 185 nursing students conducted by the research group). The factors were named 'critical thinking related to nursing tasks' and 'critical thinking in general,' including five items each. Internal consistency values for the CTLS used in *Study I* were measured at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$  for all outcomes.

The **Collaborative Behavior Scale Shortened** (CBSS) (98) includes eight items measured on a 4-point scale, where higher scores indicate a more collaborative relationship. The CBSS was translated into Swedish by the research group, and a bilingual translator carried out a back-translation (112). The CBSS has shown acceptable psychometric properties (98). Internal con-

sistency values for the CBSS used in *Study I* were measured at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$ .

The **Thriving scale** (99) comprises two factors – vitality and learning – including five items each and a single item on overall thriving, i.e., in total 11 items. Each factor as well as the total score is measured on a 7-point scale, where higher scores indicate greater levels of workplace thriving. The scale has shown acceptable psychometric values (99). Internal consistency values for the Thriving scale were measured in *Study I* and *IV* at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$ , except for the factor learning (0.65) (*Study IV*).

To measure nursing students' '**Perception of overall learning outcomes**' (100), an 8-item scale was used with response alternatives on a 5-point scale, where lower total scores represent more positive perceptions of learning outcomes. The scale has been shown to be reliable (113). Internal consistency values for the 'perception of overall learning outcomes' used in *Study I* were measured at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$ .

#### *Belief in oneself*

The **Nursing Self-Efficacy scale** (NSE) (101) includes nine items measured on an 11-point scale, where higher scores indicate more positive perceptions of nursing self-efficacy. The scale is influenced by Bandura's self-efficacy theory and was developed in accordance with his instrument guide (114). The validity and reliability have been tested and shown acceptable results (101). Internal consistency values for the NSE were measured in *Study I* and *IV* at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$ . In addition, a single item asking how '**prepared they were to cope with work as a nurse**' was used (102). This question had the same response categories as the NSE.

The Swedish version of **Spreitzer's empowerment scale** (103) includes twelve items and measures four factors: meaning, competence, self-determination and impact. Each factor is measured using three items on a 7-point scale, where higher scores indicate more positive perceptions of psychological empowerment. The scale has been shown to have acceptable psychometric properties (115). Internal consistency values for the Spreitzer's empowerment scale were measured in *Study I* and *IV* at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$ .

#### *Satisfaction*

The **Nurse-specific Satisfaction with Care** (NSC) questionnaire includes nine items measured on a 7-point scale, where higher scores indicate higher levels of satisfaction. The items were developed by Mårtensson et al. (104), adapted from the Caring Assessment Instrument (CARE-Q) (116). Validity

and reliability have been tested and shown acceptable results (104). Internal consistency values for the NSC were measured in *Study I* and *IV* at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$ .

**The Job Satisfaction Questionnaire** (105) includes 20 items and measures five factors: competence, emotion, autonomy, initiative and relation. Each factor is measured on a 4-point scale, where high scores indicate high levels of job satisfaction. Validity and reliability have been tested and shown acceptable results (117). Internal consistency values for the Job Satisfaction Questionnaire were measured in *Study IV* at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$ .

The **Brief Index of Affective Job Satisfaction** (BIAJS) (106) includes seven items measured on a 5-point scale, where higher scores indicate a higher level of satisfaction. The BIAJS was translated into Swedish by the research group, and a bilingual translator carried out a back-translation (112). The scale has shown acceptable psychometric values (106). Internal consistency values for BIAJS were measured in *Study IV* at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$ .

#### *Well-being*

The Swedish version of **WHO-Five Well-being Index** (WHO-5) (107) includes five items measured on a 6-point scale, where higher scores indicate greater well-being. The scale has shown acceptable psychometric properties (107). Internal consistency values for WHO-5 were measured in *Study IV* at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$ .

The **Specific Job Demands within the Healthcare sector scale** (SJDH – scale) (108) includes 15 items and measures four factors: pain and death, professional worries, patient and relative needs as well as threats and violence. Each factor is measured on a 4-point scale, where higher scores indicate encountering various work-related elements to a lesser extent. The scale has shown acceptable psychometric values (108). Internal consistency values for SJDH-scale were measured in *Study IV* at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$  for all outcomes, except for the factor professional worries (0.53).

The **Psychosomatic health aspects** scale (109) was used. In *Study IV*, one factor on stress symptoms was used, including eleven items measured on a 5-point scale, where higher scores indicate a more desirable state. The scale has shown acceptable psychometric properties (109). Internal consistency values for 'Psychosomatic health aspects' scale were measured in *Study IV* at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 70$ .

## Secondary outcome measure

### *Structural empowerment*

The *Conditions of Work Effectiveness Questionnaire - II* (CWEQ-II) (110) – the Swedish version (111) – was used. In *Study I*, two components of structural empowerment were measured, support and resources, and each factor was measured using three items. In addition, the 2-item global empowerment scale measured perceptions of work effectiveness. Response alternatives are on a 5-point scale for all items; higher scores represent more positive perceptions of empowerment. Acceptable psychometric properties have been reported (110,111). Internal consistency values for CWEQ-II were measured in *Study I* at baseline as Cronbach's Alpha, resulting in  $\alpha$  values  $\geq 0.70$ .

## Data analysis

Content analysis is a technique for analyzing text by making inferences to context in a systematic manner (92). The audio-recorded group interviews were analyzed using content analysis inspired by Graneheim and Lundman (94). The observations and audio-recorded conversations were transcribed verbatim and checked for accuracy. All text was read through several times to ensure understanding of and familiarity with the text. Meaning units corresponding to the study aim were identified, condensed, coded and sorted. The codes were sorted in relation to the categories from the interview guide with first-line managers, i.e., factors facilitating and hindering intervention success as well as positive and negative outcomes for the new graduates due to the intervention. The codes within each category were then sorted into sub-categories (Table 9). Two members of the research group (YP and GM) performed the identifying, coding and sorting of meaning units in dialogue.

Data from the checklist of intervention fidelity were used and described in the running text.

Data from the questionnaire were analyzed using IBM SPSS Statistics, version 22.0. Multiple imputation was used to replace missing values. To analyze changes over time, generalized estimating equations (GEE) (118) were used and a sequential Bonferroni correction was applied. The level for statistical significance was set at  $p \leq 0.05$ .



## Ethical considerations

In the present thesis, the main ethical question concerns whether the participants – especially the nursing students and new graduates – might experience an intrusion of privacy. This involved participants self-rating their learning and development, belief in themselves, the care they provided, job satisfaction as well as their well-being. Furthermore, students were observed during their clinical practice and new graduates were asked personal questions about their first time working in the nursing profession. To guarantee the participants' autonomy and integrity, all participants received oral and written information about the study aim; voluntary participation and confidentiality were assured before beginning data collection. Furthermore, the participants were informed that they could withdraw from the study at any time, without any explanations or consequences. For the nursing students in *Study II* and new graduates in *Study III* and *IV*, written informed consent was obtained. The participating students in *Study I* and first-line managers in *Study IV* agreed to participate in the study by answering the questionnaire and taking part in the group interview, respectively.

In addition, *Study II* also involved patients, thus the observations of students occurred in the context of clinical practice. In order to inform patients and relatives, a template stating the study aim was set up on the wards. Involved patients were informed about the study and asked if they would allow the observer to enter their room. For patients who were not able to give consent, a relative was asked to grant consent; otherwise, the observer did not enter that room. All patient-related data were confidential, and the observer approached observations of patient situations with particular sensitivity.

*Study I, III* and *IV* were approved by the Regional Ethical Review Board in Uppsala (Reg. no. 2013/528; 2014/192; 2014/192/2). For *Study II*, an application was sent to The Regional Ethical Review Board (2015/200), but no ethical approval was needed according to Swedish law (119). In addition, *Study III* and *IV* were registered at [www.isrctn.com](http://www.isrctn.com) (Trial ID ISRCTN14737280).

# Results

## Study I

A significant interaction effect was found for self-efficacy (NSE), with improvement for the intervention group over time [ $p=0.002$ ]; see Table 7. When studying each group separately over time, baseline to follow-up, the results showed significant improvements in the intervention group on thirteen of the twenty variables, whereas the comparison group improved on four (Table 7). Comparison of baseline measurements between the groups found that the intervention group had lower self-ratings on four variables: collaborative behavior ( $p=0.008$ ), self-efficacy (NSE [ $p=0.033$ ]) and the single-item question ‘feeling prepared to cope with work as a nurse’ ( $p=0.015$ ) as well as psychological empowerment (factor meaning [ $p=0.030$ ]).

Table 7. *Nursing students’ self-rated performance in intervention and comparison group at baseline and follow-up (Study I)*

Measurement variables	Intervention Group (n=42) Mean (SD)			Comparison Group (n=28) Mean (SD)			Change over time between groups p-value <sup>b</sup>
	Baseline	Follow-up	p-value <sup>a</sup>	Baseline	Follow-up	p-value <sup>a</sup>	
<b>Learning and development</b>							
<i>Critical Thinking Likert Scale (CTLS)</i>							
Critical thinking in general	4.8 (0.6)	5.1 (0.5)	<b>0.011</b>	4.9 (0.8)	5.0 (0.9)	0.481	0.285
Critical thinking related to nursing tasks	3.5 (0.9)	4.1 (0.9)	<b>&lt;0.001</b>	3.4 (0.9)	3.9 (1.0)	<b>0.004</b>	0.893
Total	4.2 (0.7)	4.6 (0.7)	<b>&lt;0.001</b>	4.2 (0.8)	4.5 (0.9)	<b>0.012</b>	0.637
<i>Collaborative Behavior Scale Shortened (CBSS)</i>							
Total	3.2 (0.5)	3.4 (0.5)	<b>0.036</b>	3.5 (0.6)	3.5 (0.7)	0.562	0.336
<i>Thriving Scale</i>							
Vitality	5.3 (1.0)	5.6 (0.9)	0.202	5.6 (1.0)	5.9 (1.0)	0.061	0.469
Learning	6.3 (0.7)	6.4 (0.9)	0.188	6.2 (0.7)	6.3 (1.0)	0.497	0.928
Overall thriving	5.0 (1.3)	5.3 (1.2)	0.088	5.3 (1.4)	5.8 (1.1)	0.070	0.535
Total	5.8 (0.7)	6.0 (0.8)	0.117	5.9 (0.8)	6.1 (1.0)	0.131	0.883
<i>Perception of overall learning outcomes</i>							
Total	2.5 (0.9)	2.0 (0.9)	<b>0.004</b>	2.4 (1.0)	2.1 (1.1)	0.142	0.272

<b>Belief in oneself</b>							
<i>Nursing Self-Efficacy scale (NSE)</i>							
Total	7.9 (1.8)	9.0 (1.5)	<b>&lt;0.001</b>	8.9 (1.7)	8.6 (2.4)	0.627	<b>0.002</b>
<i>Prepared to cope with work as a nurse (single-item question)</i>							
Total	8.1 (1.7)	8.9 (1.3)	<b>0.003</b>	9.2 (1.6)	9.4 (1.8)	0.500	0.133
<i>Spreitzer's empowerment scale (Psychological empowerment)</i>							
Meaning	5.9 (1.1)	6.1 (0.8)	0.098	6.4 (0.8)	6.4 (0.8)	0.931	0.372
Competence	4.8 (1.1)	5.2 (1.0)	<b>0.003</b>	5.1 (1.3)	5.4 (1.3)	0.156	0.450
Self-determination	3.7 (1.2)	4.4 (1.2)	<b>&lt;0.001</b>	4.0 (1.4)	4.4 (1.4)	0.103	0.559
Impact	2.8 (1.3)	3.6 (1.5)	<b>&lt;0.001</b>	2.8 (1.4)	3.3 (1.4)	0.063	0.938
Total	4.3 (0.9)	4.8 (0.8)	<b>&lt;0.001</b>	4.6 (0.9)	4.9 (0.9)	<b>0.040</b>	0.737
<b>Satisfaction</b>							
<i>The Nurse-specific Satisfaction with Care (NSC)</i>							
Total	5.4 (0.7)	5.9 (0.6)	<b>&lt;0.001</b>	5.5 (0.8)	5.8 (0.8)	<b>0.012</b>	0.646
<b>Secondary outcome</b>							
<i>Conditions of Work Effectiveness Questionnaire – II (CWEQ-II) (Structural empowerment)</i>							
Support	3.5 (0.8)	3.8 (0.8)	0.116	3.8 (0.9)	4.0 (0.8)	0.230	0.918
Resources	3.9 (0.8)	4.1 (0.7)	0.127	3.9 (0.7)	4.0 (0.8)	0.316	0.952
Global empowerment scale	3.5 (0.7)	3.8 (0.7)	<b>0.016</b>	3.7 (0.7)	3.9 (0.7)	0.083	0.635

<sup>a</sup> Wilcoxon signed rank test

<sup>b</sup> Mann-Whitney U-test.

The significance level is  $p \leq 0.05$ ; statistically significant results are marked with boldface text.

## Study II

To describe the collaboration between first-year nursing students using peer learning during their first clinical practice, one theme (*'Involuntary collaboration leads to growth in different competencies'*) and three categories (*'Practicing nursing skills and abilities when working together'*, *'Establishing knowledge by helping each other to understand'* and *'Sharing thoughts, feelings, and knowledge and put them into words'*) were revealed. It emerged that, irrespective of how the students collaborated using peer learning, all pairs were observed jointly practicing, to different extents, core competencies, such as nursing leadership and organization of nursing care, nursing care, collaboration/teamwork, medical and technical care, documentation in the patient records, reporting and routines.

### **Practicing nursing skills and abilities when working together**

Based on the observations, it was found that student pairs planned, prioritized, shared, performed, evaluated, documented and reported on caring for a group of patients several times a day. They jointly discussed situations and bounced ideas off each other regarding what to do, when to do it and what

they wanted to do jointly and separately, going on to present and discuss their plan with the preceptor.

When the pairs performed nursing care together, they discussed what to do and how to do it before and during actual care provision. Because the students normally talked aloud about what they were going to do, they involved the patients in the care. Furthermore, the patients were informed about, asked about and listened to how to perform activities in the best way. The student pairs evaluated actions together, with the preceptor or nurse assistant. Hence, the students had the chance to practice nursing leadership and teamwork skills in the pair as well as in collaboration with the preceptor and nurse assistant. The pairs practiced supervision skills on each other by demonstrating and guiding performance of a nursing skill as well as giving each other feedback on the work accomplished. The students practiced reporting skills both on each other but also to the preceptor, nurse assistant and during the next work shift as well as during the doctor's rounds. When reporting to others, the peers usually did this together, allowing them to support each other. Although the peers mostly chose to spend time in each other's company, some of the students occasionally preferred working alone.

### **Establishing knowledge by helping each other to understand**

Based on the observations, it was found that the student pairs jointly went through their patients to be sure they both perceived and understood things correctly, e.g., after a report or the doctor's round. The students shared knowledge and discussed difficult words and abbreviations as well as examinations and treatments their patients had undergone. The students had individually participated in various patient situations and examinations and had different previous experiences, which they could use when sharing knowledge. When neither of the students had enough knowledge, they searched for information on the patient's records or on the Internet. The peers discussed and reflected on what they read and related it to different patients as well as to theoretical knowledge. Because the pairs shared patients and everyday situations, they could associate diseases and symptoms with patients and compare different cases. Joint discussion was experienced as a natural part of peer learning. Some students chose to turn to the preceptor primarily if she/he was nearby. Students misunderstanding each other could sometimes hinder the exchange of knowledge.

### **Sharing thoughts, feelings, and knowledge and put them into words**

When the students performed nursing skills side by side, e.g. documenting in the patient's record, dispensing medications, or reading, they talked aloud about what they were doing and how they were thinking. This enabled them to get confirmation, respond to questions and start a discussion. The discussions sometimes led to solving a problem in a way staff had not. Together, the students could talk about events that had occurred as well as thoughts

and feelings associated with these events. When sharing their thoughts and feelings, discussions also emerged about their future professional role as a nurse. Furthermore, the peers discussed each other's individual and general learning outcomes as well as their own learning, including events they wanted to participate in and topics they wanted to learn more about. When the students found certain nursing skills difficult, they offered to practice them on each other.

## Study III

The deductive analysis of the interviews showed that the new graduates' description of peer learning was consistent with Boud's (1) theoretical description of common learning outcomes (Table 8). The results are presented in the categories developed based on Boud's (1) theoretical description of common learning outcomes: 'Working with others,' 'Communication and critical reflection,' 'Managing learning and how to learn' as well as 'Self- and peer assessment.'

### **Working with others**

The new graduates valued having a peer beside them as support. The situation made them feel more relaxed and reduced stress. The two individuals in the pair talked to each other about everything, shared and acknowledged each other's feelings and experiences. *'Those initial weeks of taking on the role as a nurse, it was nice to have... psychological support, to know I'm not alone.'* The pair shared new and difficult situations; they could admit their shortcomings and worries about not being sufficient, which made it less burdensome and more enjoyable. *'The role we have in relation to each other is close or... what I say to her, maybe I don't say to anyone else. If I think something's really hard it feels easier telling XX. That it's been stressful or that I haven't had time with everything. Because I know she's in the same boat.'* On rare occasions, it created confusion when peers shared their feelings of uncertainly.

### **Communication and critical reflection**

By discussing and bouncing ideas off each other, the new graduates solved any practical problems that arose. *'We try to find solutions for how we can work more efficiently or how we should organize our work.'* The peers reported that they jointly and critically reflected on their own and their colleagues' working methods. *'We talk about situations together, we get guidance from experienced staff when our way of dealing with something doesn't seem right. We discuss what we would have wanted to do and how we will solve similar problems after the introduction period.'* They described some-

times bringing up perceived shortcoming in their work and then suggesting changes after having a discussion with and receiving support from the peer.

### Managing learning and how to learn

The new graduates described how they pointed out practical issues to each other and used each other's knowledge in their everyday work. As students, they had encountered different situations during their clinical practice that they could teach each other. *'It's good when you're unsure about a patient with, for example, a CVC (central venous catheter), which I haven't worked with so much. Then XX know all about it.'* They completed procedures they were not sure about together.

### Self- and peer assessment

The pairs felt that the working climate was open, allowing them to give each other feedback. The new graduates reported checking with their peer to see whether they had performed their tasks properly. *'It feels more secure. I watch in case she makes a mistake and she watches in case I've made one. At first it's easy to make mistakes, when you're taking so much in.'* The new graduates described how they discussed their handling of different patient situations with each other. They gave each other suggestions and advice on different ways to approach problems as well as acknowledgement that they had performed the task properly.

Table 8. Boud's (1) five categories and the categorization matrix used in **Study III** as well as the respective categories definition and codes.

Boud's categories	Categorization matrix and definition	Codes
Working with others	Working with others	Sharing each other's feelings and experiences
	The peers sharing experiences and feelings with each other	Acknowledging each other's feelings and experiences
<b>Unburdening each other (emotionally)</b>		
Critical enquiry and reflection	Communication and critical reflection	Discuss and bounce ideas around to solve practical issues
Communication and articulation of knowledge, understanding, and skills	The pair learned through sharing and discussing ideas	Critical reflection on ones' own and others' working methods
	Managing learning and how to learn	Receiving help from and providing help to each other
Self and peer assessment	Managing learning and how to learn	Managing things together
	Learning by sharing knowledge and skills	Giving and receiving feedback concerning one's work
	Self- and peer assessment	Giving and receiving acknowledgment con-
	The peers giving and receiving feedback	

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and confirmation                      cerning one's work  
regarding each other's  
work

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Considering compliance and acceptability, the results showed that the new graduates using peer learning in their workplace introduction followed the intervention well during the first three weeks, and it was only absence as sickness affecting the fidelity. When looking at the fidelity of joint reflection, the new graduates reflected together the first three weeks when they had the same schedule. For the following weeks, however, the participants reported that they did not reflect together a great deal. Based on information from the interviews there were lessons learned, and the following changes were made: a) the intervention was clarified, described in a leaflet and distributed to first-line managers, participants, preceptors, and co-workers to avoid multiple interpretations; b) the peer learning period was reduced to two weeks. In the third week, the pair had the same schedule, but in contrast to the previous arrangement, the new graduates were solely responsible for a care team with support from a preceptor. The peers' respective care teams were located next to each other; c) reflection was scheduled during intervention week four to twelve, based on the new graduates' suggestion that this might facilitate taking time for this activity; d) a reflection card based on Gibbs' reflection cycle (47), with questions to ask when reflecting, was developed and distributed to the participants in *Study IV*.

The findings from the questionnaire indicated that the outcome variables changed over time, and the questionnaire was found to be useful for a future full-scale evaluation study.

## Study IV

### **Process evaluation**

Results from the group interviews are presented in two categories: 'Factors facilitating and hindering intervention success' as well as 'Positive and negative peer learning outcomes' (Table 9).

#### *Factors facilitating and hindering intervention success*

Being randomized to the control group was described as a problem because the first-line managers were in favor of the intervention and wanted to test it on their new graduates. Another problem mentioned was that the new graduates did not begin their workplace introduction at the same time, which affected the wards' opportunity to participate in the study. When a pair of new graduates were randomized to the intervention group, the first-line managers

were keen on following the study instructions. For some first-line managers, preparing for the intervention was described as requiring work, especially scheduling the reflection, whereas others thought there was no work worth mentioning. The first-line managers expressed that scheduling the new graduates' joint reflection was a change for the better, but they still had concerns about getting the new graduates to take the time to reflect. The new graduates reported that the repeated questionnaires was too extensive and that the same areas were repeated. Still, the first-line managers had encouraged them to complete the questionnaires.

The first-line managers reported that their own role in making the intervention work involved providing information and frameworks to help the staff work with and support the new graduates using peer learning, and the first-line managers also provided the new graduates support. All the first-line managers, staff and new graduates had previous knowledge of peer learning, as the model had been used in nursing students' clinical practice. Being familiar with the model was described as facilitating, for example, provision of information to staff. Structures used with the students were also being used for the new graduates' introduction. Sometimes familiarity could result in first-line managers solving a problem in the same way they did with students, but this was not in line with the intervention guideline.

#### *Positive and negative peer learning outcomes*

The first-line managers experienced that the pairs both learned to cooperate and learned together when cooperating; the pairs were perceived as independent when they were able to manage many of the nurse's duties. The first-line managers reported that the pairs supported and helped each other, even after the intervention ended. This was experienced as promoting new graduates' feelings of security, which the first-line managers thought gave them the courage to ask questions and make demands. Furthermore, they thought it was good for the new graduates to engage in joint reflection, because it allowed them to share and reflect on experiences.

The negative outcomes expressed were predominantly seen in incompatible pairs. The first-line managers described concerns that one person in the pair could experience poor self-confidence and poorer development if the other was more resourceful. In all of the group interviews, there were discussions about the advantage of the two individuals in the pair being compatible, as the first-line managers found that this resulted in the best possible outcome.

Regarding fidelity to the intervention, the results showed that the new graduates who experienced peer learning in their workplace introduction followed the intervention well during the first three weeks, and that it was only absence due to, e.g., illness that affected fidelity. Concerning fidelity to joint reflection, the new graduates reflected together the first three weeks when



they had the same schedule. For the following weeks, most of the participants (nine pairs) had joint reflection at least once a week between intervention weeks four and ten. Reasons for not taking time for reflection during the final two weeks were, e.g., lack of time and high workload.

Table 9. *Categories, sub-categories and quotations from the group interviews with first-line managers (Study IV).*

Advantages		
Categories	Sub-categories	Quotations
Factors facilitating intervention success	Having support from researchers	<i>'You felt safe with her (the researcher). // It feels like she's standing with her feet on the ground ...'</i> (Group 3)
	Giving support to new graduates and staff	<i>'I think that you have to give information about what it is about so that the employees are understood.'</i> (Group 2)
	Being familiar with the peer learning model from nursing students clinical practice	<i>"I can imagine since we started using this with students that it doesn't feel unusual or strange."</i> (Group 1)
Positive peer learning outcomes	The pair learned from each other	<i>"They arrive at good things more quickly."</i> (Group 3)
	The pair supported each other	<i>"They keep being a pair a long time, even if they don't see each other privately or didn't know each other while studying, they're a pair who help each other a little extra. They're stronger when there's two of them, they dare to made demands, bring things up. Just because there's two of them. They dare to speak out, "I've seen this," they can discuss things they think aren't right. But it's probably easier when there's two of them."</i> (Group 3)
Disadvantages		
Categories	Sub-categories	Quotations
Factors hindering intervention success	A challenge to follow the intervention and study structure	<i>"I asked myself several times – but have I really understood this? Not just saying "yes" and then neglecting to get involved, that's how I feel."</i> (Group 1) <i>"Something else we've seen a lot in this project is that they didn't start at the same time. That's the dilemma"; "That's really the problem"; "It's not like you finish school on Friday and start on Monday. You take a couple weeks of vacation..."</i> (Group 2)
	Being familiar with the peer learning model from nursing students clinical practice	<i>"...Then we separated them for a while and then put them together. Then it was better. That's what we do with students too if the two of them don't work so well together."</i> (Group 1)
Negative peer learning outcomes	Noticing problems when the pair was incompatible	<i>"...one of them took the initiative and the other didn't dare. One was absent a lot at the beginning so it didn't go so well."; "A lack of balance."; "Well, the pair wasn't well balanced."</i> (Group 1)

## RCT

A significant interaction effect was found for job satisfaction (The Job Satisfaction Questionnaire; factor initiative [ $p=0.033$ ]) between the baseline and three-week measurement, with improvement for the intervention group (Ap-

pendix A. For the other variables, there were no statistically significant differences between the two groups in changes over time. Comparison of baseline measurement factors between the groups found that the intervention group had lower self-ratings on job demands regarding the factor threats and violence ( $p=0.022$ ) at baseline compared to the control group.

# Discussion

## Summary of results

The overall aim of the present thesis was to study the use, feasibility, and outcomes of a peer learning intervention for nursing students and new graduates. When studying peer learning *outcomes* among nursing students (*Study I*), it seems as peer learning had a significant interaction effect on self-efficacy when comparing changes over time between the intervention and comparison groups. Studying each group separately over time, significant improvements were found in the intervention group on thirteen of the twenty variables, whereas the comparison group improved on four. When examining the effect of the peer learning intervention in workplace introduction among newly graduated nurses, it was difficult to draw conclusions due to recruitment problems. Thus, the study hypothesis could be neither accepted nor rejected (*Study IV*). Observing how nursing students *used* peer learning (*Study II*) revealed that the student pairs collaborated to different extents and in different ways. All students were observed practicing several competencies together, such as organization of nursing care, performing nursing care, cooperation/teamwork, medical and technical care, documentation in the patients' record, reporting and following hygiene routines, all of which are important to their future profession. When testing application of the peer learning model to new graduates' workplace introduction (*Study III*), the results showed that new graduates' description of peer learning was consistent with the theoretical description of common peer learning outcomes. Furthermore, *feasibility* was tested in relation to compliance with and the acceptability of the peer learning intervention, the results showing that there were lessons learned and improvements made. In *Study IV*, fidelity to the intervention was good the first ten (of the total twelve) weeks. However, during the final two weeks, only three of the eleven pairs of new graduates took time for joint reflection. When first-line managers described their perception of the peer learning intervention used in new graduates' workplace introduction (*Study IV*), predominantly positive outcomes were expressed.

## The outcomes and use of peer learning

The discussion of the outcomes and use of peer learning is based on the results from the quasi-experimental study (*Study I*) and observations (*Study II*) of nursing students as well as on individual interviews with new graduates (*Study III*), group interviews with first-line managers, and an RCT study targeting new graduates (*Study IV*).

### How peers learn together and being supervised

Student pairs were observed (*Study II*) discussing and bouncing ideas off each other to solve practical issues as well as managing things together, all of which were also described by the new graduates in interviews (*Study III*). Examples of practical problems students and new graduates discussed were, e.g., how to prioritize, the best way to accomplish medical procedures or what to document in patients' records (*Study II* and *III*). Interestingly, the discussions were sometimes observed to end with the students solving a problem in a way staff had not (*Study II*). Students reported having insufficient time to discuss and reflect during clinical practice, which is important in helping them make sense of what they are learning (120). Discussing and bouncing ideas off each other has been well described in peer learning studies (8,9,79,80,82,83,86,88) and is in the literature described as one of the key factors in peer learning (1,73). The first-line managers experienced that new graduates who had been introduced to the workplace in pairs were more independent than those who had been introduced traditionally (*Study IV*), something previously described by nursing students (7) and preceptors (77).

Nursing students in the intervention group (peer learning) rated improved learning and development (perception of overall learning outcomes scale) over time (*Study I*). In the observations, the nursing students were seen identifying and discussing their learning outcomes and were jointly engaged in achieving them. Furthermore, peers were seen helping each other to understand various aspects of nursing as well as jointly searching for more information or knowledge when needed, then relating their knowledge and new findings to the patients they jointly cared for (*Study II*). These results are consistent with a recent study on peer learning, showing that students using peer learning self-rated their professional progress significant higher compared to students supervised in a traditional manner (78). During interviews, new graduates described using each other's knowledge in their everyday work. During their nursing education, they had encountered different situations and could teach each other about them (*Study III*); this was also described by first-line managers (*Study IV*). Sharing knowledge is among the assumptions underlying peer learning and is included in both Boud's (1) description of general peer learning outcomes and in socio-cultural theories

(66,121). It has also been well described in earlier peer learning studies (7–9,81,85).

Several peer learning advantages described in earlier studies as well as in the literature have also been found in the present studies. *Study I* added a quantitative approach to the knowledge about self-rated learning and development of peer learning outcomes, whereas the observations (*Study II*) complemented earlier findings concerning how students actually act in the collaboration. Given the perspectives of new graduates (*Study III*) and first-line managers (*Study IV*), this might be a reason to assume that new graduates would benefit from having a peer to relate to during workplace introduction.

### Giving each other emotional support

Nursing students were observed giving each other feedback, checking with each other to see that they had performed their tasks properly and perceiving things the same way (*Study II*). Pairs of new graduates described similar experiences during their workplace introduction. Further, new graduates reflected on deficiencies they observed in their work and how they could handle these. They described how they sometimes jointly addressed the perceived deficiencies and suggested changes (*Study III*). Similar outcomes were observed by first-line managers, who described how new graduates' feelings of security in the pair gave them the courage to question things and make demands. Further, first-line managers reported that the pairs supported each other during the workplace introduction and even after the intervention had ended (*Study IV*). In earlier studies, a supportive peer relationship and reflection with peers have been reported to improve student confidence (31) and facilitate empowerment (64). Further, positive feedback between peers has been described by nursing students and preceptors as increasing students' feelings of confidence (8) and as being important in boosting new graduates' confidence (4).

Nursing students who had the opportunity to learn with a peer during clinical practice self-rated significant improved levels of perceived nursing self-efficacy (NSE) over time compared to students supervised in the tradition manner. Furthermore, when studying the intervention (peer learning) and comparison (traditional) group separately over time, baseline to follow-up, the results showed significant improvements on the single item on self-efficacy in the intervention group only (*Study I*). According to Bandura (67), self-efficacy refers to the belief that one is capable of achieving a goal or an outcome. Individuals' self-efficacy influences how they feel, become motivated, think and behave. If people believe they have what is necessary to perform, they will try to make things happen. Furthermore, Bandura (67), describe that peers play an important role in the development and validation of self-efficacy. In addition, three psychological empowerment factors out of four (competence, self-determination, and impact) were improved over time

in the intervention group only (*Study I*). When persons feel empowered at work, positive individual as well as workplace outcomes are likely to occur (103).

First-line managers reported being concerned that one person in the pair might experience poorer self-confidence and poorer development if the other person was more resourceful (*Study IV*); this has also been described in previous studies on students' (79,83,85) and preceptors' (77) perspectives. In interviews with the new graduates, single individuals mentioned that their peer could cause them to experience feelings of uncertainty and confusion (*Study III*). However, findings from the observational study showed that the student pairs collaborated to different extents, from working close together to trying to evade collaboration with the student peer, as well as that, irrespective of how they collaborated, they practiced several competencies together (*Study II*). Still, it is important to be aware of the potential problem, as the absence of strong negative emotions regarding deficient capabilities is one factor influencing self-efficacy (67). Physiotherapy students and preceptors reported factors that facilitated compatibility as having similar levels of ability, motivation and the ability to respect the peer's knowledge and practice (79). Holst et al. (122) observed pairs of nursing students from different semesters and concluded that collaboration problems within a peer were a matter of lacking respect for the other person's learning and for how one person's learning can affect the other person. Furthermore, they stressed that the preceptors were important in creating structure for peers' collaboration when it was lacking.

In a healthcare environment described as complex, challenging, stressful and as marked by personnel shortages (10), it is easy to imagine the importance of the supportive relationships described by students (31,32,35) and new graduates (61,62,123) to the success of clinical education and workplace introduction. The problem of preceptors' lack of time for supervision have been described by students (18), new graduates (56,124) and preceptors (125) as well as in an observational study on supervision (126). Having a peer, facing the same challenges in the same context with the time to bounce and reflect, giving support and feedback as well as listen and understand could be a valuable resource. A peer relationship might ease the transition from nursing education to the clinical environment and be fundamental to new graduates' well-being, which was described in interviews (*Study III*) but not confirmed in the RCT study (*Study IV*). Feedback and building relationships are also described as important in the socialization process (127), where new graduates learn the process and roles of their profession in order to gain the knowledge and skills necessary to function in that role (128).

## Peers developing professional skills together

When investigating the effects of peer learning in nursing students' clinical practice, collaborative behavior was self-rated, showing significant improvements over time for the peer learning group only (*Study I*). Collaboration was observed when nursing students worked together (*Study II*) as well as described by new graduates (*Study III*). Furthermore, first-line managers experienced that when new graduates used peer learning during their workplace introduction, they both learned how to cooperate and learned while cooperating (*Study IV*). Collaboration is the fundamental assumption of peer learning, and collaborative skills are included in Boud's (1) description of general peer learning outcomes. Collaboration is likewise one of the nursing profession's core competencies (23,25).

Nursing students were observed to allow their patients to get involved in their own care (*Study II*), which is consistent with the core competence 'person-centered care' (25). In the theory 'Communities of Practice' (CoP), Le May and Wenger (121) suggested that by including patients in their caring, students can integrate patients' opinions into their learning experience and that these opinions will become part of their professional capital. Caring for patients in a holistic manner (129) and providing good individualized care (49) were described as important to nursing students.

The students showed each other how to perform nursing skills and gave each other feedback on the performance, thereby practicing teaching and supervision skills. Supervising each other seemed to be a natural part of the peer partnership (*Study II*), and this was also described in interviews with new graduates (*Study III*). In their collaboration within the pair, as well as in teamwork with the preceptor and nurse assistant, the students had the opportunity to practice leadership skills (*Study II*). In nursing students' self-reports, teaching and supervision were rated lower than competencies involving patient-related nursing (51). In an integrative review, Jessee (31) reported that having the opportunity to educate and being educated by student peers increased their self-efficacy. Nursing leadership, including organizing and prioritizing nursing care, have been reported as a competence nursing students need to practice (52) and was described as a major stressor for new graduates (33).

Learning to collaborate is essential to nursing and was described in all studies in the present thesis. Practicing leadership skills is a relatively unexplored area in peer learning, where peers are enrolled in the same course, but have been noticed in research when the peers consist of students from different education levels (130,131). The reason this area is relatively unexplored might be that students are not aware that they are practicing these skills on each other, and hence do not describe them in the interviews.

When investigating the effects of peer learning in clinical practice education on nursing students' self-rated performance, four variables – critical thinking (CTLS; the factor 'critical thinking related to nursing tasks' and total scale), psychological empowerment (Spreitzer's empowerment scale; total scale), and satisfaction with provided care (NSC) – were improved in both groups (*Study I*). This was not surprising, because students are generally satisfied with the clinical practice (132–134) and have reported high achievement of learning outcomes in clinical practice (100). No variables were found to improve only in the comparison group.

## Development and evaluation of a peer learning intervention

The present discussion of the development and evaluation of a peer learning intervention is based on results from interviews and questionnaires targeting new graduates (*Study III*), checklists for fidelity (*Study III and IV*), group interviews with first-line managers and an RCT study (*Study IV*).

The development and evaluation of peer learning to be used in a new context, i.e. new graduates' workplace introduction, included several parts, some of which were described in *Study III and IV*. Development of the intervention began with identifying relevant evidence however, not concluded in a review. Furthermore, the variables included in the questionnaires were thoroughly discussed and reflected on, in the research group concerning expected peer learning outcomes. The research group consisted of individuals with expertise in the peer learning model, qualitative and quantitative methods as well as intervention studies. A first small pilot study was conducted with three pairs to examine the new graduates' reception of the peer learning intervention, the recruitment process as well as the information needed for the intervention to be doable. Furthermore, the participants were interviewed about their experience of obstacles and facilitators in the transition from student to nurse as well as about perceived support. The pilot study confirmed that three months seemed as a reasonable period for the intervention. Furthermore, several of the variables included in the questionnaire were described in the interviews. After the small pilot test, a steering group including the research group and first-line managers was established to develop the intervention.

In *Study III and IV*, the testing and development of the intervention continued using a combination of qualitative and quantitative methods described by the MRC (89,90) as having the benefit of enriching the gathered data. It seemed reasonable to assume that new graduates could experience the same positive aspects of peer learning that have been described in interviews with



students. Several reviews (4,5,58) have reported on new graduates having the opportunity to meet, socialize and share experiences in a group, and how they increased each other's ability to cope with stress. Results from the deductive content analysis (*Study III*) showed that the descriptions from interviews with new graduates were consistent with the theoretical description of common peer learning outcomes. Concerning compliance with and the acceptability of the intervention, there were lessons learned and changes were made. According to the MRC (89,90), feasibility studies can be useful if one wishes to understand how an intervention works in a new context, and process evaluations of feasibility studies can indicate whether the intervention has been delivered as intended. Problems with compliance and acceptability as well as with recruitment and retention are described as common and as undermining evaluations. Measures of intervention fidelity in *Study IV* showed that participating pairs generally followed the intervention well. Thus, the improvements, e.g. taking time for reflection, might indicate that the changes made after *Study III* had positive effects on intervention fidelity in *Study IV*.

In the feasibility study (*Study III*), two participants out of ten (20%) did not complete any of the questionnaires. The RCT study (*Study IV*) had an estimated sample size of 152 new graduates, including an estimated loss of 15%. Of the 44 new graduates recruited for randomization, 35 (79%) completed the baseline questionnaire. In retrospect, it might have been relevant to ask the participants questions about the questionnaire in the feasibility study. Yet, the MRC framework states that feasibility/piloting studies should address the main uncertainties that have been identified, but should be interpreted with caution when making assumptions about, e.g., sample size and response rate (89,90). The first-line managers reported that the new graduates found the questionnaires to be too extensive and that the same areas were repeated, which could have affected the response rate. Furthermore, they mentioned problems with recruiting, as new graduates did not start their workplace introduction at the same time. This was not expected to cause any severe problem, as no concerns about the complexity of recruitment had surfaced in the feasibility study (*Study III*) or in the steering group. Nevertheless, the MRCs describes the importance of conducting a process evaluation when the intervention is tested in a larger sample, as new problems will probably appear (89,90).

## Methodological considerations

The main strength of the present thesis is that different designs and data collection methods were used to generate new knowledge about peer learning. The interventions in all of the studies included in the thesis were implemented in a collaboration, which can be seen as a strength with regard to compli-

ance. To ensure that the intervention worked as planned and to avoid contamination, YP had regular contact with the clinical lecturers who ensured that the intervention group received peer learning as intended and that the intervention was only implemented on the intended wards (*Study I*). For *Study III* and *IV*, a checklist for fidelity was used to examine the extent to which the intervention followed its plan. However, there is always a risk that there could be diffusion of the intervention to the comparison and control group, respectively. Further, another strength was use of the MRC framework to guide the development and feasibility testing/piloting of a peer learning intervention in a new context. To make the research process more transparent, a trial registration was published before starting the study enrolment (*Study III* and *IV*). When testing the peer learning intervention in a new context (*Study III* and *IV*), one strength was that data were collected from both new graduates and first-line managers, which resulted in findings that reflect multiple perspectives.

## The quantitative methods

### **Design, sample and participants**

A quasi-experimental design (*Study I*) can result in selection bias and differences between groups, as the participants were not randomly assigned. Generally, differences between groups may affect the results. At baseline, the intervention and the comparison group (*Study I*) differed significantly on four variables, whereas in *Study IV*, the intervention and the control group differed on one variable. However, looking at the groups' baseline values, there was room for improvements. Furthermore, demographic characteristics did not differ significantly between the groups (*Study I* and *IV*). The small sample size could affect the results, which should, thus, be interpreted with caution, as there is a risk the data might not support the hypotheses even when the hypotheses are correct. Nonetheless, *Study I* provided promising results, showing that the peer learning group improved on thirteen of the twenty variables. However, the intervention period may have been too short for improvements in performance and if an extended period had been used, interaction effects may have been observed for other variables. In *Study IV*, a power analysis was performed to estimate the sample size required (112), but due to recruitment problems, and thus a small sample size, the hypothesis could either be accepted or rejected. *Study III* was a feasibility study in which the design itself was to test the intervention in a smaller sample; for this reason, the results should be interpreted with caution. The pairs in *Study IV* were block-randomized into groups of ten to ensure both groups were randomized close to each other in time. The groups of nursing students and new graduates participating in the present thesis included lower proportions

of men than the respective original populations. This might influence the findings' generalizability to other groups.

### **Data collection and analysis**

The variables included in the questionnaires were thoroughly discussed and reflected on, both individually and in the research group concerning expected peer learning outcomes. In the questionnaires, two instruments (CTLS and CBSS) used in *Study I* and one instrument (BIAJS), used in *Study III* and *IV* were translated into Swedish by the research group, and a bilingual translator carried out a back-translation. All but one of the instruments used (CTLS) had documented validity and reliability. For the CTLS, a factor analysis was performed (unpublished data), but further tests of validity and reliability are required. The questionnaire in *Study I* was tested concerning whether the questions were relevant, distinct and whether the instructions for the questions were clearly described; this resulted in a minor revision. Cronbach's  $\alpha$  values for all instruments, total scale and factors were measured at baseline, resulting in  $\alpha$  values  $\geq 70$  for all outcomes (*Study I* and *IV*), except CWEQ-II (global empowerment) in *Study I* and Thriving (factor learning) and the SJDH scale (factor professional worries) measured in *Study IV*. CWEQ-II (global empowerment) and the SJDH scale (factor professional worries) consisted of two items each, which might affect the components' reliability. The baseline questionnaire in *Study IV* was completed at the end of the first week of the introduction and may not be considered a traditional baseline measurement, because the new graduates had experienced their new workplace for a week.

In *Study I*, the proportion of non-respondents was higher in the comparison group than in the intervention group. However, there were no differences between participants and non-responders at baseline regarding any of the study variables or demographic characteristics.

The standard for analyzing data from RCTs (*Study IV*) is to use an intention-to-treat analysis, including analyzing data from all participants who were randomized regardless of whether they dropped out of the study. Multiple imputation is at present regarded as one of the best methods for addressing missing values problems (118). Imputation methods use the other variables in the dataset to predict the missing value. However, even if recommended imputation methods are used, the results must be interpreted with caution, as the imputed values are predicted and there is uncertainty as to their true value. Due to the large number of analyses, 23 variables were analyzed on four occasions, a sequential Bonferroni correction was applied to establish a more conservative alpha level.

## The qualitative methods

### **Trustworthiness**

Trustworthiness is an overall concept used in qualitative research to discuss the validity. There has been debate about the most appropriate term to use for assessing qualitative research validity. Some researchers argue for using the term validity as is used in quantitative research, whereas others advocate using terms specific for qualitative research (112). In present thesis, trustworthiness will be discussed in relation to credibility, dependability and transferability (93).

### *Credibility*

Credibility refers to confidence in the truth of the findings and the interpretation of them (112). Credibility involves two aspects: ‘carrying out the study in a way that enhances the believability of the findings and taking steps to demonstrate credibility in research reports’ (112). To achieve credibility, several aspects were considered during the research process. The researchers are important to credibility when collecting and analyzing the data, and it is important to understand that the researchers’ perspective is likely to influence interpretation of the data (93). The researchers’ preconceptions were described and discussed in the research group, including how these preconceptions could influence the different data collections and analyses and thus important to describe. Furthermore, the question of whom the most appropriate person was to do the observations and interviews was discussed. Although it was important to be aware of the influence of being familiar with the context and researchers’ preconceptions, the authors’ knowledge in the area might also enriched the data through the quality of their questions and probes.

The data collection methods used were considered to be appropriate to the study aim. According to Graneheim et al. (135), the appropriate sample size depends on the study aim, the observation to be conducted or questions to be asked and how rich the data are. In *Study II*, purposive sampling was used, and different specialties as well as organizations were included. Furthermore, the pairs differed in age, experience and perspectives, which can be seen as a strength (94,135,136). The student pairs were observed for a total of 164 hours, including several different situations; this resulted in rich data. The exact number of participants had not been determined before the observations (112).

In *Study III*, the new graduates were included using convenience sampling. However, the participants had varied experience, started their workplace introduction at three different hospitals and had completed their Bachelor of nursing degree at three different Swedish universities. The data were rich, including 47 interviews conducted during the three months of intervention.

In *Study IV*, the group interviews with first-line managers should be interpreted with caution due to the small sample size. Given the number of participants, it might have been more advantageous to use individual interviews, allowing the first-line managers to choose the time and place individually. However, the methodology used for the group interviews generated varied and interesting data through interactive spontaneous group discussions, which seemed to be suitable for the study aim. During the group discussions, the participants seemed to be familiar with each other, the topic did not seem to be sensitive, and each participant had approximately the same amount of time to speak. The participants had different experiences and came from both medical and surgical wards.

To reduce the risk of the researchers' subjectivity affecting the data, two authors in the respective studies performed the identifying, coding and sorting of meaning units in a dialogue. All authors involved in the studies were engaged in repeated discussions concerning the identified codes, sub-categories, categories and/or themes, resulting in a consolidation of the findings. The analysis process included the researchers going back and forth between the different stages. This procedure can strengthen both the credibility and the dependability (94). No data related to the study aim were left over.

### *Dependability*

Dependability refers to showing that the findings are consistent over time and under different conditions (112).

To increase dependability, data were collected during a limited period. Furthermore, for each study, the same person performed the data collection. To strengthen the dependability of *Study II*, YP conducted the first two observation sessions together with a co-author to develop ideas about how best to perform the observations, informal conversations and to synchronize what they observed. YP constantly reflected on her role as an observer and being a part of as well as influencing the interaction. For the interviews (*Study III* and *IV*), semi-structured guides were used to ensure they covered the same topics and to reduce the risk of researcher subjectivity when performing the data collection. The interview guides were developed and discussed with all of the co-authors (94).

### *Transferability*

Transferability refers to showing that the findings can be applied to other contexts. It relies on the reasoning that findings can be generalized or transferred to other settings or groups (112). By describing the characteristics of participants, setting, data collection, process of data analysis in as detailed a way as possible and by presenting the result using rich illustrative excerpts, the readers can determine the strengths and limits of the study as well as whether the results are applicable to other contexts (92). By relating the

study's results to earlier research, the authors can help readers determine its transferability. The results on students in present thesis might be transferable to first-year nursing students in Sweden as there are similar education and context. For new graduates, the interviews showed that the new graduates' description of peer learning was consistent with theoretical description of common learning outcomes (*Study III*). Thus, it seems reasonable to assume that the benefits of peer learning on nursing students could be transferable to new graduates. Nonetheless, it is up to the reader to make the final judgement as to whether transferability has been achieved.

# Conclusions

The studies in this thesis were conducted to generate new knowledge about the usefulness of peer learning during nursing students' and newly graduated nurses' pathway into the profession. The results are based on both quantitative and qualitative methods and the conclusions are that peer learning is a useful model for nursing students that seems to improve self-efficacy more than traditional supervision does. The model gives nursing students opportunities to practice several competencies on each other during clinical practice, and these competencies, e.g., leadership and organizational skills, are useful in their future profession. The students discuss and identify learning outcomes together. Further, they practice teaching and supervision skills on each other, which seems to be a natural part of the peer relationship. Peer learning in the context of new graduates' workplace introduction is described in a way consistent with the theoretical description of peer learning outcomes. When developing and testing new interventions such as peer learning, it is important to do so systematically to minimize problems when conducting an evaluation, where the MRC framework can be useful. Further, first-line managers generally expressed a positive attitude toward the peer learning model used when introducing new graduates.

## Clinical implications and suggestion for future research

The present thesis contributes knowledge that is valuable for clinical education of nursing students, newly graduated nurses' workplace introduction as well as the area of development and testing of complex interventions in a healthcare environment.

The results show that peer learning creates learning environments that affect nursing students' learning more than traditional supervision does. The results reveal improved self-efficacy as well as improvements in collaborative behavior, learning outcomes, perceived psychological empowerment and access to global empowerment. Further, the thesis increases the understanding of how students learn in collaboration with each other and gives students the opportunity to develop useful competencies. The result revealed that although the pair is not compatible they learn important competencies together. Given the present results on peer learning used during clinical practice and findings from earlier studies, exemplary higher education institutions should continue to inform students and practice educators of the benefits associated with peer learning.

Although peer learning does have positive outcomes, more research is needed, including exploration of other clinical areas, repeated placements, different levels in the nursing program and experimental studies, such as RCTs with larger groups and conducted over an extended period of time.

Considering the perspectives of new graduates and first-line managers, it might be reasonable to assume that new graduates would benefit from having a peer relation during their workplace introduction. However, the intervention might have to be adjusted, because new graduates typically do not begin their workplace introduction at the same time.

Future research is needed to develop and evaluate supportive workplace introduction programs as well as to compare them to each other, the goal being to find support strategies that can help new graduates through the first challenging period in their profession.

Interventions within healthcare are often complex, and this includes interventions designed to support new graduates' transition. This thesis contrib-



utes results from a feasibility study and a mixed-methods study with process evaluation and a randomized controlled trial (RCT), both guided by the MRC framework. The present study found positive experiences of and fidelity to the peer learning intervention. Regarding the experimental design, there were lessons learned; this was also confirmed by the interviews with first-line managers and stated in the MRC framework. Using a structured framework when implementing a complex intervention ought to be the gold standard.

## Svensk sammanfattning (Swedish summary)

Kamratlärande (peer learning) är en modell där personer som befinner sig i liknande situation lär av och med varandra genom interaktion. Modellen har sitt ursprung i teorier om social inläring. Teorierna omfattar att erfarenheter, förståelse och kunskap formas och utvecklas i samspel mellan människor. Studier har visat att sjuksköterskestudenter som använde kamratlärande under sin verksamhetsförlagda utbildning upplevde att de tillsammans utvecklar såväl yrkesrelaterad kompetens som samarbetskompetens. Studier där kamratlärande ingår en del av nyutexaminerade sjuksköterskors introduktionsprogram har inte hittats. Emellertid finns studier som har visat att nyutexaminerade sjuksköterskor som möts och delar erfarenheter kan stödja varandra hjälper i att hantera stress. När en komplex intervention (som ex. att införa kamratlärande i nyutexaminerade sjuksköterskors introduktionsprogram), ska utvecklas och utvärderas är det viktigt att göra detta systematiskt. Här kan Medical Research Councils ramverk användas som vägledning.

Avhandlingens övergripande **syfte** var att undersöka användande, genomförbarhet och utfall av interventionen kamratlärande. Målgruppen där kamratlärande användes var sjuksköterskestudenter och nyutexaminerade sjuksköterskor. För att undersöka syftet användes kvasi-experimentell (*Studie I* och *III*), beskrivande (*Studie II*) och beskrivande/experimentell (mixad) (*Studie IV*) **design**. Data samlades in via frågeformulär, observationer, checklistor för kontroll av efterföljsamhet till interventionen, regelbundna individuella intervjuer samt gruppintervjuer.

**Huvudresultatet** visar att när en grupp sjuksköterskestudenter handledes genom a) kamratlärande (interventionsgrupp) eller b) traditionell handledning (jämförelsegrupp) jämfördes över tid fanns en signifikant interaktionseffekt i hur de skattade tilltron till sin yrkesförmåga (self-efficacy) där interventionsgruppens självskattning ökade över tid och jämförelsegruppen minskade. När grupperna studerades inom respektive grupp (intervention och jämförelsegrupp) över tid framkom att interventionsgruppen förbättrades på tretton av de tjugo variabler som undersöktes och jämförelsegruppen förbättrades på fyra (*Studie I*). Vid observationer av hur sjuksköterskestudenter samarbetade när de använde kamratlärande under den verksamhetsförlagda utbildningen framkom att studenterna samarbetade på olika sätt och i olika utsträckning (*Studie II*). Vidare kunde observeras att samtliga studentpar tillsammans tränade sig i att organisera och leda omvårdnadsarbete, utföra

omvårdnad i samråd med patienten, samarbeta (i paret och i teamet), genomföra medicin-tekniska uppgifter, dokumentera, rapportera samt arbeta utifrån riktlinjer. Dessa kompetenser är samtliga viktiga i sjuksköterskestudenters kommande profession. När kamratlärande testades i ett nytt sammanhang d.v.s. under nyutexaminerade sjuksköterskors arbetsplatsintroduktion visade det sig att de nya sjuksköterskornas beskrivning om kamratlärande överensstämde med den teoretiska beskrivningen (*Studie III*). I samma studie testades även om interventionen (kamratlärande) användes på det sätt den var tänkt (följsamhet) samt om interventionen accepterades av de nyutexaminerade sjuksköterskorna. Resultatet visade att lärdomar kunde dras och förändringar gjordes till efterföljande studie. I *Studie IV* var följsamheten till interventionen generellt bra. När första-linjens chefer intervjuades i grupp angående deras upplevelse av kamratlärande under nyutexaminerade sjuksköterskors arbetsplatsintroduktion framkom övervägande positiva erfarenheter. Angående vilka effekter kamratlärande hade i gruppen nyutexaminerade sjuksköterskor kunde inga slutsatser dras på grund av problem att rekrytera deltagare (*Studie IV*).

Slutsatsen utifrån avhandlingens fyra studier är att kamratlärande bör ses som en användbar modell under verksamhetsförlagd utbildning och modellen förefaller öka studenters tilltro till sin egen förmåga mer än traditionell handledning gör. Kamratlärande ger sjuksköterskestudenter möjlighet att träna flera kompetenser, viktiga i deras kommande profession. Att handleda varandra verkar vara ett naturligt inslag av kamratlärande. Nyutexaminerade sjuksköterskor beskriver kamratlärande på ett sätt som överensstämmer med den teoretiska beskrivningen av kamratlärande. När en intervention ska testas i ett nytt sammanhang bör detta göras systematiskt för att minimera problem som kan uppstå under utvärdering av en intervention där Medical Research Council ramverk kan vara ett användbart stöd. Generellt uppfattar första-linjens chefer kamratlärande som en introduktionsmodell med många fördelar.

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# Appendix A

*New graduates self-rated answer from the repeated questionnaire in the intervention and control group as change over time between groups (Study IV)*

<b>Measurement factors</b>	<b>Measurement</b>	<b>Intervention Group (n=21) Mean (SD)</b>	<b>Control Group (n=14) Mean (SD)</b>	<b>Change over time between groups Measurement</b>	<b>p-value</b>
<b><i>Learning &amp; Development</i></b>					
<b><i>Thriving Scale</i></b>					
Vitality	1/2	5.32/5.29	5.56/5.60	1-2	0.759
	3/4	5.10/5.07	5.60/5.38	1-3	0.261
		1-4			
Learning	1/2	6.29/6.38	6.41/6.43	1-2	0.734
	3/4	6.13/6.11	6.51/6.61	1-3	0.193
		1-4			
Total	1/2	5.80/5.83	5.99/6.02	1-2	0.984
	3/4	5.62/5.59	6.06/5.99	1-3	0.168
		1-4			
<b><i>Belief in oneself</i></b>					
<b><i>Self-efficacy</i></b>					
<b><i>Nursing Self Efficacy scale (NSE)</i></b>					
Total 7R	1/2	8.92/8.79	8.68/8.49	1-2	0.898
	3/4	8.61/8.88	8.50/8.80	1-3	0.818
		1-4			
<b><i>Prepared to cope with work as a nurse (single-item question)</i></b>					
Total	1/2	4.70/5.01	5.14/4.81	1-2	0.134
	3/4	5.19/5.14	5.50/5.20	1-3	0.752
		1-4			
<b><i>Psychological empowerment</i></b>					
<b><i>Spreitzers' s empowerment scale</i></b>					
Meaning	1/2	6.14/6.17	6.52/6.51	1-2	0.857
	3/4	6.09/5.92	6.18/6.13	1-3	0.189
		1-4			
Competence	1/2	4.84/4.94	5.38/5.25	1-2	0.465
	3/4	5.09/5.25	5.39/5.50	1-3	0.434
		1-4			
Self-determination	1/2	3.76/3.92	4.45/4.42	1-2	0.654
	3/4	4.09/4.15	4.61/4.38	1-3	0.597
		1-4			



Impact	1/2	3.62/3.75	4.40/4.32	1-2	0.535
	3/4	3.92/4.03	4.54/4.35	1-3	0.688
				1-4	0.266
Total	1/2	4.59/4.69	5.19/5.13	1-2	0.271
	3/4	4.80/4.84	5.18/5.09	1-3	0.216
				1-4	0.146
<b>Satisfaction</b>					
<b>Satisfaction with provided care</b>					
<i>Nurse-specific Satisfaction with Care (NSC)</i>					
Total 9	1/2	5.07/5.10	5.25/5.41	1-2	0.618
	3/4	5.08/5.31	5.44/5.46	1-3	0.432
				1-4	0.904
<b>Job satisfaction</b>					
<i>The Job Satisfaction Questionnaire</i>					
Competence	1/2	2.43/2.55	2.69/2.66	1-2	0.274
	3/4	2.32/2.41	2.54/2.55	1-3	0.858
				1-4	0.553
Emotion	1/2	2.05/2.17	2.46/2.31	1-2	0.172
	3/4	1.99/1.97	2.45/2.37	1-3	0.814
				1-4	0.955
Autonomy	1/2	1.60/1.59	1.74/1.51	1-2	0.322
	3/4	1.46/1.53	1.65/1.59	1-3	0.790
				1-4	0.758
Initiative	1/2	1,88/2,11	2,26/2,14	1-2	<b>0,033*</b>
	3/4	1,91/2,02	2,22/2,11	1-3	0,791
				1-4	0,180
Relation	1/2	2.27/2.43	2.31/2.45	1-2	0.940
	3/4	2.08/2.16	2.45/2.49	1-3	0.182
				1-4	0.235
<i>Brief Index of Affective Job Satisfaction (BLAJS)</i>					
Total	1/2	3,89/3,61	3,92/3,97	1-2	0,157
	3/4	3,62/3,43	4,03/3,92	1-3	0,153
				1-4	0,082
<b>Well-being</b>					
<i>WHO-Five Well-being Index (WHO-5)</i>					
Total	1/2	60,95/55,43	64,00/59,37	1-2	0,888
	3/4	57,29/51,31	62,74/61,03	1-3	0,711
				1-4	0,317
<b>Job demands</b>					
<i>Specific job demands within the health care sector scale (SJDH – scale)</i>					
Pain and death	1/2	2,12/2,18	2,31/2,52	1-2	0,279
	3/4	2,37/2,43	2,59/2,67	1-3	0,848
				1-4	0,795
Professional worries	1/2	2,40/2,52	2,32/2,33	1-2	0,540
	3/4	2,15/2,15	2,23/1,99	1-3	0,414
				1-4	0,748
Patient and relative needs	1/2	1,80/1,87	2,04/1,95	1-2	0,502
	3/4	1,88/2,24	2,14/2,07	1-3	0,921
				1-4	0,089

Threats and	1/2	1,13/1,27	1,48/1,82	1-2	0,233
violence	3/4	1,33/1,68	1,54/1,62	1-3	0,338
				1-4	0,114
<b><i>Stress symptoms</i></b>					
<i>Psychosomatic health aspects</i>					
Total	1/2	1,95/1,90	2,19/1,98	1-2	0,413
	3/4	1,71/1,61	1,87/1,91	1-3	0,664
				1-4	0,768



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