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Original Article

# Use of interprofessional simulation-based learning to develop perioperative nursing students' self-efficacy in responding to acute situations

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ABSTRACT

Self-efficacy is an essential concept regarding academic performance and persistence in higher education. Research indicates that interprofessional simulation-based learning influences participants' self-efficacy and points to a need for more research on self-efficacy and its development. This study describes perioperative nursing students' experiences with how interprofessional simulation-based learning contributes to self-efficacy in communication, interdisciplinary collaboration, and prioritising tasks in acute situations. Six qualitative focus group interviews were conducted with thirty-four perioperative nursing students from four universities and university colleges in Norway. Qualitative directed content analysis was applied in accordance with Bandura's social cognitive theory which specifies four sources influencing self-efficacy. Results showed that well-designed/prepared interprofessional simulation-based learning can develop self-efficacy concerning communication, interdisciplinary collaboration, and prioritising tasks in acute situations.

## 1. Introduction

The perioperative nurse works in an interprofessional surgical team and provides advanced care for patients in high-dependency situations where the patient's condition can change quickly. To work rationally under stress and ensure safe outcomes for patients requires comprehensive knowledge and team skills Smith (2019). The role description of a perioperative nurse varies across countries. In the present study, perioperative nursing is defined as care delivered by specialists: qualified registered nurses and practitioners known as operating room nurses, scrub nurses, theatre nurses, and circulating nurses Callaghan (2011).

Perioperative nursing requires advanced professional education incorporating emotional, cognitive, and professional development to achieve competence (Chernikova et al., 2020). To respond to these requirements, education incorporates simulation-based learning (SBL) to prepare students for the complexities and challenges of clinical practice. In SBL students learn how to utilize theoretical knowledge in authentic situations in which they deal with tensions concerning theory and practice. SBL includes learning to perform routine tasks, communication techniques, and higher-level learning through analysis and problem-solving (Pilcher et al., 2012). It

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offers affective, cognitive, and psychomotor challenges, incorporating a credible picture of reality where practical and theoretical learning and its complexities are integrated. SBL also allows repetition, feedback, evaluation, and reflection (Bland, Topping & Wood, 2011).

Fidelity in SBL refers to the degree to which participants experience the enactment as authentic. This is associated with the extent to which the real event or workplace is replicated, including physical, psychological, and environmental elements (INACSL, 2016b; Lioce et al., 2020). SBL consists of three parts: (1) briefing, which includes information and orientation regarding the equipment, environment, manikin, roles, learning objectives, and the clinical scenario; (2) participants taking active roles in a scenario; and (3) debriefing, where participants, guided by a facilitator, reflect on the session. In the debriefing, reflective thinking is promoted, feedback is given, and aspects of the fulfilled simulation are discussed (Tyerman, Luctkar-Flude, Graham, Coffey & Olsen-Lynch, 2019).

Besides SBL, we refer to interprofessional simulation-based learning (ISBL). ISBL is used to deliver collaborative learning in a context that reflects clinical practice without the risk of harming the patient. An interprofessional team defines a set of two or more people of more than one profession who interact together, dynamically, interdependently, and adaptively, toward a common goal (Reeves, Boet, Zierler & Kitto, 2015). In ISBL perioperative nursing students are part of an interprofessional surgical team and learning is directed towards improvement in interprofessional communication and collaboration to ensure quality patient care. The World Health Organisation (WHO) emphasises evidence that programs with an interprofessional approach enable effective collaborative practice WHO (2010).

## 2. Theoretical framework

Self-efficacy refers to "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" Bandura (1997). Perceived self-efficacy is not a measure of the skills one has, but belief about what one can do under different sets of conditions with whatever skills one possesses (Bandura, Freeman & Lightsey, 1999). Bandura (1997) highlights that self-efficacy relates to an individual's capability and ought to be phrased in terms of "can do" rather than "will do" because it involves an assessment of one's own ability instead of a will that represents an intention. Bandura also describes collective efficacy as "a shared belief in the power to produce effects by collective action" Bandura (2000).

In recent decades educational research has paid growing attention to the development of self-efficacy, and how it influences students' behaviour, learning processes and performance in various situations Bandura (2006). Evidence exists that self-efficacious students take part more readily, work harder, persevere longer, and have fewer inappropriate emotional reactions when they encounter difficulties than those who do not believe in their capabilities Bandura (1997).

### 2.1. Development of self-efficacy

Bandura proposes that a person's development of self-efficacy beliefs comes from "four principal sources of information" Bandura (1997). The four sources do not operate in isolation from one another, but rather connect and guide one another Bandura (1997). The first and the most powerful source is enactive mastery experiences, in which people judge themselves based on activities which can be experienced as resulting in failure or in success. The second source is where people have gained experiences through observing their peers, also called vicarious experiences. Information regarding one's own capabilities is gained through this observation and subsequent reflection upon one's upcoming performance doing the same task Bandura (1997). The third source is when people obtain information about their capability to perform a task verified through verbal persuasion. Verbal persuasion, social influences, and feedback are more effectual when provided by knowledgeable and reliable persons within their field, and when they are experienced as realistic. The fourth source of development of self-efficacy is through information that is gained from physiological and emotional states, such as anxiety, stress reactions, and tension throughout the performance of tasks. Positive feelings can strengthen self-efficacy, and negative feelings such as dejection can enfeeble it Bandura (1997).

### 2.2. Self-efficacy in SBL/ISBL

Research indicates that ISBL/SBL influences self-efficacy (Egenberg, Øian, Eggebø, Arsenovic & Bru, 2017; Karabacak et al., 2019). Cant & Cooper (2017) in pretest-posttest studies found that SBL improved participants' self-efficacy. A meta-analysis confirmed that SBL is an effective method to increase self-efficacy amongst novice nurses, in particular when compared to traditional didactic lectures (Franklin & Lee, 2014). One study indicated greater improvement in self-efficacy amongst postgraduate nursing students and physicians participating in ISBL compared to uniprofessional activities (Watters et al., 2015).

### 2.3. The study aims

There is limited research regarding how to effectively deliver ISBL and provide the optimal support for such learning (Dahlgren, Rystedt, Felländer-Tsai & Nyström, 2019), and concerning how ISBL contributes to the development of self-efficacy. Furthermore, there is little knowledge concerning ISBL in the field of perioperative nursing (Kaldheim et al., 2019). Therefore, this study aims to describe perioperative nursing students' experiences with how interprofessional simulation-based learning contributes to self-efficacy in communication, interdisciplinary collaboration, and prioritising tasks in acute situations.

## 3. Method

This study employed a qualitative design using directed content analysis. This methodology explores a phenomenon utilizing theory as a guide (Assarroudi, Heshmati Nabavi, Armat, Ebadi & Vaismoradi, 2018;Hsieh & Shannon, 2005). Directed content analysis can be both deductive and inductive. This study first deductively applied Bandura's theory of self-efficacy and its four sources of information that affect self-efficacy beliefs as predetermined categories Bandura (1997). Then an inductive process commenced, developing specific codes within each predetermined category (Humble, Zvonkovic & Walker, 2008).

### 3.1. Participants

Department managers at six Norwegian universities and university colleges were offered institutional participation in the study. Two universities and two university colleges agreed and subsequently were included. Perioperative nursing students who had enroled in a postgraduate program or a master's degree program in perioperative nursing were approached as potential participants. They were provided information and recruited by their teachers. To avoid bias and ethical conflicts, their teachers were required to inform the perioperative nursing students that their decision to participate would have no consequences on their further studies. To gain data that was open for variation, we did not influence the design and preparation of the ISBL. Still, we had inclusion criteria: Participants were eligible for inclusion if they (1) had experienced ISBL along with other professionals (e.g., anaesthetic nursing students) during their education, (2) the ISBL scenario included an acute situation that focused on learning interprofessional collaboration and communication, and (3) the focus group interviews were conducted within three months after the students had participated in ISBL.

### 3.2. Data collection

Data collection was conducted between April and October 2019, and it consisted of six focus group interviews, with four to eight participants in each focus group. The first author, the moderator, asked questions. An Assistant Professor from the University of Agder served as assistant moderator and took field notes during all the focus-group interviews. The interview guide contained open questions that targeted the students' experiences with ISBL, linking it to the development of self-efficacy. The first focus group interview was conducted with eight perioperative nursing students who had participated six months earlier in ISBL as a pilot interview in which the interview guide was reviewed for clarity and relevance, and it was suggested whether supplementary questions should be added. This resulted in only minor corrections, e.g. 'Can you discuss?' was changed to 'Can you tell?'. We chose to include the data from the pilot interview in the final analysis. Despite participating in ISBL six months earlier, data from the participants involved in the pilot interview contained abundant information that was relevant for our aim. Furthermore, since these participants distinctly remembered their experiences of ISBL, and because there were only minor corrections in the interview guide, we assumed that this did not add bias to our data set.

All the focus group interviews, which had an overall mean duration of 122 min, took place in group rooms at the students' respective educational institutions, audio-recorded and were transcribed verbatim by the first author.

### 3.3. Ethical consideration

Institutional approval was received, and the study followed the ethics governed by the World Medical Association Declaration of Helsinki WMA (2013). The Norwegian Centre for Research Data (NSD, ref. 2019/363,692) approved the study. It was emphasized to participants that participation was voluntary and that they had the right to withdraw at any time.

### 3.4. Analysis

Directed content analysis in accordance with Hsieh & Shannon (2005) and Assarroudi et al. (2018) was utilised (see Fig. 1). Directed content analysis is generally based on an existing theory about a phenomenon (Hsieh & Shannon, 2005; Polit & Beck, 2017; Sandelowski, 1995). After stage one where the first, second, and last authors read all the textual data several times to get a sense of the whole it was experienced data saturation, as no new data were emerging (Sandelowski, 1993). Bandura's theory was scrutinized to

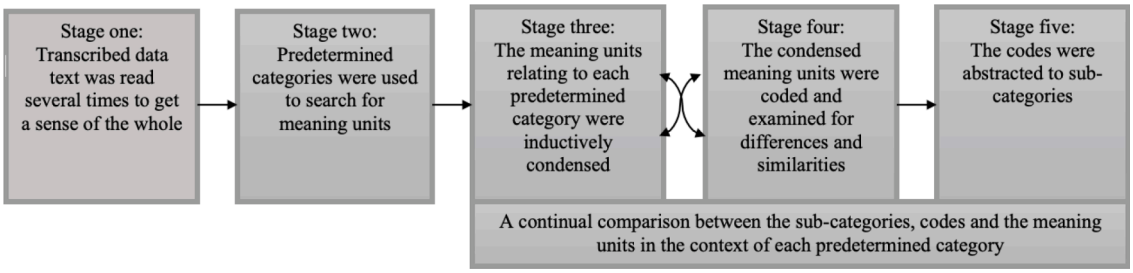


**Fig. 1.** The analysis processes using directed content analysis.

identify the main concepts. The self-efficacy theory of Bandura and its four sources of information to develop self-efficacy Bandura (1997) were set as four predetermined categories: mastery experience, vicarious experience, verbal persuasion and social influence, and physiological response to performance. In stage two, these predetermined categories were applied to the data, and the first author searched for meaning units that correlated with each of the predetermined categories. In this stage, NVivo[12] was used to structure the text. In stage three, the meaning units were transferred from NVivo[12] to MS Word, and the meaning units relating to each predetermined category were inductively condensed (see Table 1). All authors discussed the condensation. In stage four, the first author coded the condensed meaning units and discussed the codes with all the other authors. During this coding we returned to the text and performed re-analysis to provide an opportunity for identifying texts missing from the predetermined categories and texts which had recently emerged (Assarroudi et al., 2018). In stage five, the codes were abstracted to sub-categories in a back-and-forth process where we examined the codes for differences and similarities, and in the end the sub-categories were abstracted into their representative predetermined categories.

**Table 1**
Examples of the directed content analysis.

| Meaning units | Condensations | Codes | Sub-categories | Predetermined categories |
|---|---|---|---|---|
| P15: It is a part of the mastery, I'll say. You know that you can get this done in a short time. You can do it. In a short time, you can put on that knife blade without cutting yourself or dropping it. Oh then, there is something about knowing what to find that contributes to that security. | To experience that it is part of the mastery to know that in a short time you can pick up the knife blade and attach it without cutting yourself or dropping it, and to know what to find that contributes to that feeling of security. | The feeling of mastery challenges in an acute situation. | Feeling of mastery. | Mastery experience. |
| P31: That is probably the benefit I got as an observer. Where you somehow see, and it's kind of nice if you see exactly where communication fails. Or when they give a message and the others do not get this message, or something, if you are aware of such things. Or the other person may have to be a little aware that he received this. That one nods or says yes or confirms something or other. It is a little exciting to see how fast things can go wrong. We say something, and we continue to work, even if they have not confirmed that either. It's a little interesting. | To experience the benefits of being an observer by seeing where the communications fail, or if a message was given and they did not manage to hear, and one becomes aware of these things, or that someone nodded or said yes to affirm. It is exciting to see how fast things can go wrong because then something is said, and they continue working, even if they did not hear it. | To observe others and see what is important in interprofessional communication. | To gain competence through observing. | Vicarious experiences (the experience of observing others). |
| P14: That review afterward is important in relation to somehow thinking about what you have actually done. Oh, you might be left with some questions afterward that you might need to get answers to. Like why did things go wrong, or why did they go well? Oh, what did I actually do right and what did I do wrong? Oh, it's one thing to say good things about yourself or bad things about yourself, but to hear from the teachers who are observing, I think that's very important. | To experience that the review is important for you to think about what you have done, and you have some questions that you need answers to, such as why things went wrong and why they went well, because it is one thing to say good things about yourself, but it is important to hear this from teachers and observers. | To request feedback from a competent person in a professional manner. | The desire for constructive feedback. | Verbal persuasion and social influences. |
| P31: I was supposed to be a surgeon once too ("that's right", says one in the room). Once as a doctor, and it's just that silly. I have no idea (several in the room say "no"). Moderator: So, there was also something with the roles there? P31: And this also becomes a moment of stress concerning that. | To feel the experience of being a surgeon, even though that it is silly because you do not understand what it is like at all. This also becomes a stressful moment. | Taking on a role outside their own profession. | Unnecessary stress. | Physiological response to performance. |

### 3.5. Trustworthiness

Using directed content analysis presents challenges, as one approaches the data with an informed albeit strong bias (Hsu, Chang & Hsieh, 2015). Self-efficacy is a complex concept, and the authors believe that a framework is essential to capture its essence. To ensure the trustworthiness of the analysis, we used the four criteria of credibility, dependability, transferability, and confirmation (Lincoln & Guba, 1985). To ensure credibility, all authors were involved in the whole interpretation process, ensuring that the findings were faithful to the participants' experiences and representative of participants' descriptions of their experiences with ISBL. To exclude bias, all authors reflected together and individually on the codes and sub-categories and how well they covered the data. To ensure credibility and variation across the homogenous group, we included a wide sampling of perioperative nursing students from four Universities in Norway Lincoln & Guba (1985). Furthermore, all stages of the research process are described to ensure dependability. ISBL is utilized as an educational approach within different institutions and the results can be transferable to other educational contexts. To ensure confirmation we reflected on our preunderstanding through all stages of this research and focused on remaining open and objective when reading the transcripts.

## 4. Results

Thirty-six perioperative nursing students signed written informed consent, and thirty-four participated: 31(91%) were females, and 3 (9%) were males. Participants' age ranged between 25 and 50 years (mean: 34.5 and SD: 7.2). Prior to commencing postgraduate studies, they had worked as RN between 2 and 24 years (mean: 9.4 and SD: 6.5). Before entering postgraduate education, six participants had never participated in SBL, whilst 11 had participated 1–5 times; five had participated between 6 and 10 times, five had participated in SBL 11–15 times, and four had participated in SBL between 16 and 20 times.

The findings of how ISBL contributes to perioperative nursing students' development of self-efficacy in communication, interdisciplinary collaboration, and prioritising of tasks in acute situations are reported according to the predetermined categories from the primary sources of self-efficacy. These constitute mastery experience, vicarious experience, verbal persuasion and social influence, and physiological response to performance (see Fig. 2).

### 4.1. Mastery experience

Participants expressed that they gained mastery experiences through ISBL. This gave them faith that they would be able to master

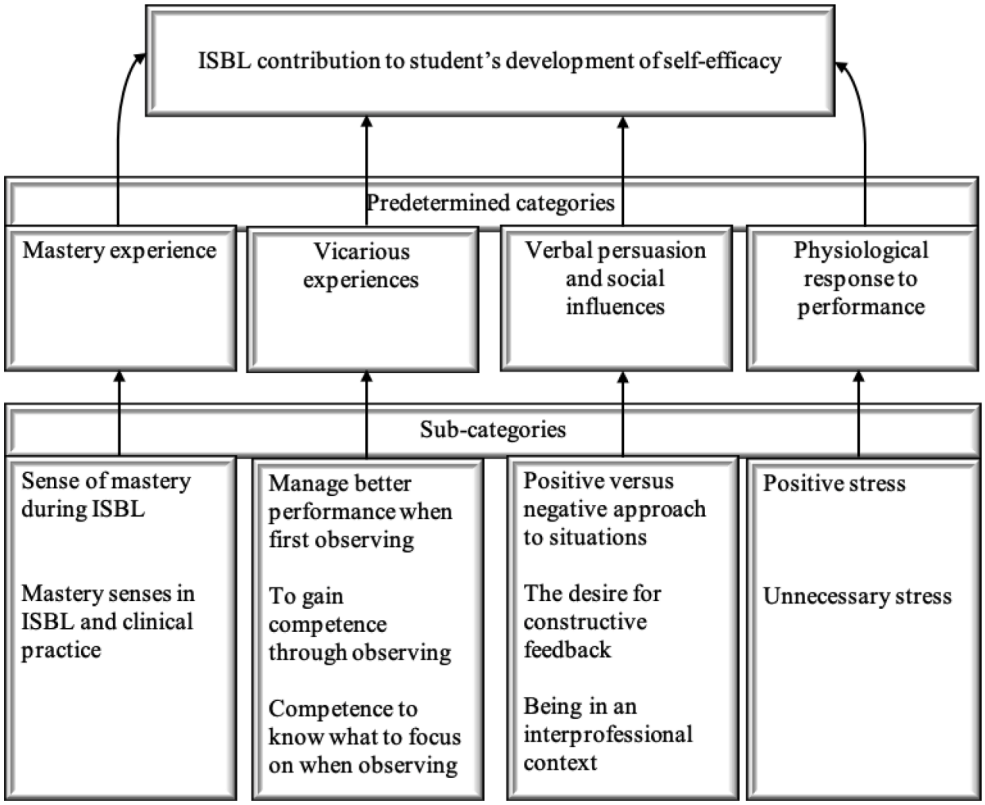


**Fig. 2.** Overview of predetermined categories and sub-categories.

similar acute situations when they entered clinical practice. They also stated different mastery senses experienced in ISBL and clinical practice.

#### 4.1.1. Sense of mastery during ISBL

The sense of mastery was, for the participants, to succeed in managing tasks during an acute ISBL situation. They sensed mastery by organising the instruments, attaching the knife blade without cutting themselves, and handing the instruments to the surgeon.

> *P31: "It was a bit of mastery to stand there and, in a way knowing what I should hand over, and to give the right instruments and then see that everything was working well."*

Furthermore, participants expressed that they gained valuable competence in communicating, interdisciplinary collaboration, technical skills, and prioritising in acute situations. This contributed to greater confidence that they would master similar situations in clinical practice.

> *P25: "You see that if you manage it in a simulation, then you know that there is a greater chance that you will manage to do it in the real world, as well. So, I think it is important that it* [*ISBL*] *seems real then. Because then you will be more confident* [*that you will manage*]*. Then you think you are mastering it to a greater degree."*

For the participants to gain a sense of mastery, the ISBL case needed to be within a level they could manage.

#### 4.1.2. Mastery senses in ISBL and in clinical practice

Some participants expressed a difference in mastery senses in ISBL and clinical practice, related to experiences of emotions when an acute situation represented a living patient in a life-or-death context. Knowing that one was responsible in an acute situation, where the patient could die, prompted stronger emotional reactions when they mastered than in an ISBL, where the patient was a monitored manikin which they knew could not die.

> *P27: "For my part, I feel that it is one thing to master it in simulation, but it is another thing to master it in real life. They are two different things. But if you experience mastery in the simulation, then it makes you think that you will manage it in clinical practice. Like in a real situation. But I do not think that the real feeling of mastery comes until you do it with a real person."*

Hence, for some, the mastery experience was more intense when experienced in clinical practice than during ISBL.

### 4.2. Vicarious experience

Participants said that observing others first led to self-reflection over others' performance, and this started a thought process on how they were going to solve the challenges of simulated cases themselves.

#### 4.2.1. Manage better performance when first observing

When participants observed others prior to their ISBL, they found it easier to enter and be active in the scenario themselves. After initial observations, assessments of the performance were experienced more positively.

> *P19: "The second team was much better structured. So, they were simply better prepared than the first. P21: It went a little faster too for our part, and we had more pace. P16: Yes, it was like that for us too."*

Mistakes made in the first simulation session were corrected; the participants further understood what they should focus on and how the simulation was carried out. They found it was easier to focus on the case and the learning objectives. Even when the simulation session had appeared chaotic, they learned from previous mistakes.

> *P14: "I think that simulation…, at the very beginning when you see how chaotic it is, maybe it* [*self-efficacy*] *drops a little. But in the second round, when you also see that you have learned from the mistakes in the first round, the belief in self-efficacy increases considerably."*

In general, they viewed the second simulation team to be more structured and calmer, managing to place greater focus on non-technical skills. Communication in these teams was regarded to be clearer, and those who actively simulated were able to immerse themselves more quickly into the respective roles.

#### 4.2.2. To gain competence through observing

Participants experienced observing others as vital because it resulted in increased competence in prioritising during acute situations. When being active, they did not have this opportunity as they were focusing on their professional roles and tasks. To conclude, the participants identified that it was easier to capture non-technical skills such as communication within the team as an observer.

> *P19: "Yes, I think the second team was more concerned with communication than the first team. So, they communicated better. They talked to each other, didn't they?*
>
> *P20: Clear communication. P19: Much clearer communication, yes. And yes, people went much better into their roles than in the first simulation."*

Participants gained insights into the need for communicating clearly in an acute situation. They also noticed the importance of how communications involved everyone, and how quickly a lack of communication could lead to things going wrong.

#### 4.2.3. Competence to know what to focus on when observing

When participants felt they lacked competence in the context of the simulation, they found it difficult to know what to focus on observing during the session:

> *P30: "Also, it was the observer role then. I was one of those in that section, and I was one of those who had never seen it before. Then you were told to observe the others. We were a couple, but what was it we should observe? It was very challenging. I had no idea what to observe, even with that guidance."*

In the simulated emergency case so much was going on, which was then experienced as messy, making it difficult for the observing participants to decide what to focus on without the appropriate knowledge.

### 4.3. Verbal persuasion and social influence

The participants discussed the facilitators' approach at the beginning of a debriefing, and their own need for constructive feedback. They also expressed experiences of being students from one profession along with students from other professions participating together in ISBL.

#### 4.3.1. Positive versus negative approach to situations

It was essential for the participants that the facilitator had a positive approach at the beginning of a debriefing by focusing on what had gone well. This created a safe atmosphere to touch on other situations where the participants could have performed tasks more efficiently. Furthermore, having a positive approach strengthened participants' experiences of mastery in ISBL, leading to positive reflection in the debriefing.

> *P8: "You get a better feeling then. P9: Yes, you do. At the same time, you wonder if they have caught everything. Have they* [*the facilitator, observants*] *seen everything that happened in the scenario? They may have turned their backs, but you might go home with a slightly better feeling then. P10: Yes, also that you, perhaps you get a bit of a feeling that you have mastered something then."*

Participants who took an active role during a simulation stated that they wanted to carry it out correctly, and they put high demands on their own performance. They said that they were critical of their own performance, so during the debriefing it was not easy for them to assess themselves in an objective way, see things in a larger perspective, and highlight what they did well. It was important for the active participants to have the support of others to identify what went well.

If a facilitator initially approached a situation negatively and focused on what went wrong, it could lead to a predominantly negative focus. This was experienced as demotivating, and participants felt a lack of psychological safety during the reflection, with little opportunity for further self-reflection on their own practice.

#### 4.3.2. The desire for constructive feedback

Participants expressed they wanted to understand their own performance through constructive feedback and answers to their questions from people with relevant competence.

Furthermore, participants experienced that it was constructive to receive both positive and negative evaluations and constructively discuss them together in a learning environment where everyone could learn from each other.

> *P18: "Using constructive feedback, you do not have to feel bad if you talk about mistakes. When we somehow pull together all the threads and experiences, maybe I do not know what I did well. Maybe you know what I did well? Like this: 'Oh yes, that was true!' That we can pull each other up a bit and figure out what we can do differently next time, I feel that's really an imperative."*

The feedback had to be created together and be descriptive in a non-judgmental way, to create psychological safety for participants to discuss their performance and learn from mistakes, thus establishing a positive learning experience.

#### 4.3.3. Being in an interprofessional context

The participants expressed their experiences of simulating in an interprofessional context. When the whole team was focused on as a unit during ISBL and the different educational professions received equal attention, this gave participants a feeling of being a part of the team.

> *P5: "Also, for me that they focus on the whole team, and also on perioperative nursing. That they do not skip us, no. P4: That everyone is equally important. P5: Yes. They were very interested in the whole team then. So, it's clear that then you feel more like a member of the team."*

When they felt included, a sense of psychological safety was provided, which gave them the courage to speak up in the team, thereby developing the necessary knowledge.

> *P5: "It is like she said … We were two teams then, as she said, and that we had knowledge about things, but we did not dare say it. That might happen when others just stand there, and you just have to say that in reality. You shouldn't be afraid of it then. You might have learned a little about the communication, so you have to dare to speak up. You are not just a little perioperative nurse; you have learned a little and are more capable then. But daring to do this is not something we have experienced in clinical practice. Maybe you can take that away with you then, from the simulation."*

If participants had experienced their profession getting less attention in an ISBL, they felt their professional role in the interprofessional team was not as significant.

The content of the simulation case had to contain tasks that included their future professional roles, and that enabled reflective thinking regarding their future tasks and professional roles.

### 4.4. Physiological response to performance

Physiological responses were largely linked to feelings of stress during participation in an ISBL. Participants expressed two kinds of stress, described as positive stress and unnecessary stress.

#### 4.4.1. Positive stress

Positive stress provided challenges that could give rise to a feeling of mastery when working in an acute situation. They expressed that this enabled them to get to know themselves better and how they worked in such a situation, and it provided realistic experiences of similar stress that they would have been under in a real acute situation.

> *P21: "Yes, the only thing I knew I should have right in front of me was a knife and a pair of scissors. I forgot all the tweezers. At least I had the knife in place. Yes, I probably learned a lot. I think it is important to learn about yourself then. P17: And to put the knife blade on when your pulse is at 120. P18: It's not easy then. P17: Yes, I was fumbling. P21: Yes, I just forgot the other instruments. P17: Yes, me too. P21: And then I put the knife blade on* [*the knife*] *only with my fingers. All the others held their breath for me when I was doing that."*

To experience positive stress, they needed to 'feel the effects of adrenaline' and participate actively by immersing themselves into the simulation role. This way, they got to perceive how to work under stressful conditions and subsequently experienced this as positive stress. Also, working under stressful situations did not mean that everything went as planned, but it was a good and useful learning experience when it ended positively.

Participants said they needed to feel their pulses racing and to feel stress in order to allay the uncertainty and come to feel safe in emergencies. They wanted to feel more secure and gain greater faith that they would be able to work in an emergency, first by practising in simulation cases, and also having the opportunity to try it out in clinical practice.

#### 4.4.2. Unnecessary stress

The participants perceived some stress that was experienced as unnecessary, and which caused them to lose concentration and focus during ISBL participation, hindering them from immersing themselves into the ISBL.

Situations that generated unnecessary stress were expressed when the participants did not feel that they were well-enough prepared before entering ISBL, were assigned a role outside their professional domain, or when they perceived ISBL as artificial. This made them feel insecure. This raised the stress levels and reduced the participant concentration needed to manage the simulation case's challenges. It also hindered their feelings of mastery.

> *Moderator: "So, you all experienced that you felt you were playacting a little? When you were all entering the simulation? P7: Yes. P11: We do that. And it shouldn't be underestimated that we do. P8: Yes. I experience extreme stress from it. P7: I feel stressed just thinking about it. P10: Right now, I feel that I get stressed by it. P8: Yes, I feel terrible stress. P9: Yes, you get hot and stressed by it."*

Furthermore, ISBL was stressful when participants experienced that they were being assessed, which induced feelings of performance anxiety. Therefore, it was essential to feel secure within the group of simulation participants.

## 5. Discussion

The aim of this study was to describe perioperative nursing students' experiences with how interprofessional simulation-based learning (ISBL) contributes to self-efficacy in communication, interdisciplinary collaboration, and prioritising tasks in acute situations.

Bandura's four principal sources Bandura (1997) to develop self-efficacy beliefs were used as an analytical framework, and the discussion is structured accordingly.

### 5.1. Mastery experience as a source for developing self-efficacy

During the ISBL participants gained the belief that they could execute, but not that they would master, the clinical skills. They judged their ability to perform in a similar acute case when entering clinical practice. This aligns with Bandura's proposition (2006) that self-efficacy involves assessing one's ability. ISBL increased the participants' ability and confidence in communication, interdisciplinary collaboration, and prioritisation in an acute situation, which increased their self-efficacy in these areas. The results support Bandura's theory (1997) and other studies on ISBL/SBL (Cant & Cooper, 2017; Egenberg et al., 2017), that participants who have mastery experiences increase their self-efficacy.

In the present study, some of the participants experienced different intensities in the perception of mastery in ISBL compared to clinical practice. Bandura (1997) defines mastery experiences as being context-specific. The patient in our study was a simulator manikin which, unlike patients in clinical practice, could not die. This exemplifies two different contexts connected to the participants' fidelity experiences (INACSL, 2016b; Lioce et al., 2020) which, in turn, could have influenced our participants' ability to immerse themselves into the ISBL scenario. To be immersed in the ISBL scenario, the participants had to experience "as if" they were in a real clinical practice situation. According to Yoo & Kim (2018), such immersion can lead to a 'flow experience' as an optimal mental state. This is created when people sense great pleasure in the activity itself and are strongly involved Csikszentmihalyi (2014), and it is seen as an essential aspect of SBL (Yoo & Kim, 2018). In our study, when the training context appears as being different from clinical

practice, it affects the immersion and flow experience of the participants. This again affects their perception of mastery. This is in line with Yoo and Kim (2018), who contend that fidelity is associated with students' flow experiences during SBL: those who perceived the simulation as being more realistic reported higher flow levels.

In this study, when ISBL was experienced as realistic, replicating real clinical practice, it can be seen as a situation-specific practice that can be used to expose participants to high-risk situations which they might experience within their clinical practice. As such, it offered the participants authentic evidence about their own abilities and capabilities.

Since self-efficacy is closely linked to motivation and learning (Pajares, 2006; Schunk, 2003), educators need to design ISBL that enables participants to achieve mastery experiences. Participants in our study experienced that to gain feelings of mastery, the ISBL case had to be on a level of difficulty they could manage. Stalheim and Nordkvelle (2018) also found that self-efficacy is linked to the difficulty of the ISBL situation. As Bandura (1997) states, failure reduces mastery beliefs, particularly when experiencing failure before a strong belief in self-efficacy has been built. Therefore, it is essential that ISBL/SBL must adjust the level of complexity/difficulty to allow for success in order to build strong beliefs of self-efficacy in perioperative nursing students.

People with high self-efficacy beliefs who judge that they can manage a challenge are more likely to view challenges as something that could be mastered instead of something to avoid Bandura (1997). Using ISBL in a perioperative nursing educational programme to develop participants' self-efficacy can augment perioperative nursing students' performance in ISBL and clinical practice, as well as their academic performance and ability to learn new skills.

### 5.2. *Vicarious experience as a source for developing self-efficacy*

Participants in our study noted that when they started by observing other participants in a simulation case, it made them reflect on how they would solve the simulation case's challenges. This is in line with Stalheim & Nordkvelle's (2018) findings that observing other's performances invites students to reflect on the other students' actions. When observing, the tasks and challenges are observed, recognised, reinforced, and repeated. According to Bandura (1997), this leads to an increase in self-efficacy by recognising that one can copy observed action in ISBL (Pajares, 2002).

In the present study, participants identified that it was easier to capture non-technical skills as an observer. Observing others was essential to gain competence in communication, interdisciplinary collaboration, and prioritisation in acute situations. These results are in line with a study by Rogers, Baker & Franklin (2020)), who found that observers have a better opportunity to get an overview and see the larger picture, which can bring about positive learning outcomes concerning knowledge, clinical judgement, teamwork, critical thinking, and conceptual thinking. Also, observers who observed before being active in a simulation case perform the tasks more correctly. For some participants, starting as observers gave them an opportunity for focused observation, reflection, and planning when compared to their peers who started as active scenario participants. Still, building on vicarious experiences not only occurred when observing others performing a task successfully, but also observing others' mistakes and correcting them. This was also found by Stalheim & Nordkvelle (2018), who concluded that observers learn from the mistakes made by active participants in the simulation session. Our participants first perceived the simulation sessions as chaotic. In the second round they noticed that the simulation teams appeared to perform their work more calmly and with more structure, which increased the participants' self-efficacy beliefs.

In order for our participants to accurately judge observed performance against their own capabilities, they needed enough competence germane to the context of the simulation case, and the person being observed had to be on a similar competence level. This finds support in a review by Usher & Pajares (2008) which emphasises that education levels are essential for self-efficacy information. Furthermore, vicarious information obtained from others who are perceived to be on a similar level of ability seems to be the most influential.

### 5.3. *Verbal persuasion as a source for developing self-efficacy*

In the present study, participants stressed that it was essential that the facilitator take a positive approach when giving feedback in the debriefing, by focusing on what had gone well. This agrees with Bandura's (1997) theories that point out that feedback must focus on the improvement and performance gains of participants. Then feedback can develop participants' self-efficacy regarding their capabilities to accomplish a task and improve their performance (Bandura, 1997; Schunk, 1989). Hence, a facilitator needs competence in simulation pedagogy (INACSL, 2016a) and awareness of the importance of verbal persuasion for developing self-efficacy. Participants in our study were critical of their own performance and experienced it difficult to self-assess. The difficulty in evaluating one's own performance after a simulation session has also been found by Maibach, Schieber, & Caroll (1996). Therefore, evaluative feedback can develop self-efficacy through the source of verbal persuasion.

Based on this study's findings, participants need constructive feedback and answers to their questions from people with relevant competence. Bandura (1997) also emphasises that it is essential that verbal persuasion be constructive, timely, and honest to encourage or boost self-efficacy. When the facilitators took a positive approach, it contributed to a safe atmosphere for our participants. It enabled them to touch on other situations where they could have performed tasks more efficiently. This way, constructive feedback was positive in tone and provided opportunities to enhance performance and learn from mistakes. This is supported in a study by Van Dinther, Dochy & Segers (2011) concluding that feedback to higher education learners needs to be constructive rather than purely critical, and that constructive feedback fosters self-reflection, which helps learners focus on their improvement. As well, feedback concerning learners' capabilities should come from a credible source (Van Dinther et al., 2011). In the present study, facilitators competent in perioperative nursing provided a credible source for the participants, which developed their self-efficacy in handling acute situations. When self-efficacy beliefs are fostered through verbal persuasion, credibility is of major importance

Bandura (1997).

Another finding of this study is that to create collective efficacy it is imperative to develop ISBL that includes all the professional groups represented in an authentic situation. Furthermore, to pay them equal attention and offer verbal feedback from a team perspective, through engaging facilitators. This is essential since collective efficacy also motivates more robust team member behaviour, affecting the teams' functioning (Tasa, Taggar & Seijts, 2007). This study shows that the perception of equal value boosted participants' collective efficacy and developed professional identity.

### 5.4. Physiological response as a source for developing self-efficacy

SBL exposes participants to feelings of stress (Kang & Min, 2019), which can influence their performance in ISBL (Al-Ghareeb, Cooper & McKenna, 2017). In our study participants described two kinds of stress: positive stress and unnecessary stress. Stressors deals with challenges or strains we face in various situations. How we deal with these challenges depends on our earlier experiences with similar situations and how we experience the relevant stressors Ursin & Eriksen (2004). Participants' stress reactions and "the effects of adrenaline" helped them immerse themselves in the simulation scenario. Positive stress provided realistic experiences of the stress they would have had in a real acute situation. Self-efficacy theory acknowledges that students' physiological response to stress can influence their learning and capacity to handle a given situation Bandura (1997). The current study suggests that positive stress enabled participants to manage their feelings and handle this stress in an acute situation. This is important for developing self-efficacy beliefs according to Leigh (2008), who stresses that gaining control of emotions in acute situations can develop higher self-efficacy beliefs. When the ISBL gave rise to positive stress (as a positive feeling) amongst the participants, it served as a source to strengthen their self-efficacy beliefs. Theoretical support for this has also been claimed by Pajares (1997), who argues that positive emotions can strengthen self-efficacy.

The opposite was the participants' experience of unnecessary, preventable stress. Unnecessary stress occurred in conjunction with participants' feelings of insecurity and unsafety. Such unnecessary stress generated negative feelings amongst the participants, and according to Pajares (1997) this can weaken self-efficacy. Studies in SBL emphasise the significance of creating a safe simulation environment to ensure participants' psychological safety (Page-Cutrara & Turk, 2017; Rudolph, Raemer & Simon, 2014). Our study found that unnecessary stress affected participants' concentration and detracted focus from the intended learning outcomes. Hence, they did not manage to immerse themselves into the scenario. To create conditions for successful SBL, educators have to ensure that the participants have the prerequisites to entering a learning environment, engaging themselves and immersing themselves (Rudolph et al., 2014). The International Association of Clinical Simulation and Learning (INACSL) Standards Committee has published simulation design criteria where adequate briefing, simulation of the scenario/case, a facilitative approach, and debriefing are described as imperative for successful SBL (INACSL, 2016b). This fits well with our results, where participants said that a high level of unnecessary stress could be reduced by being well-enough prepared, having enough information and competence, and promoting psychological safety and ISBL scenario realism.

In the present study, feeling safe meant not feeling assessed, as that can gave rise to feelings of performance anxiety. Hsiang-Te Tsuei, Lee, Ho, Regehr and Nimmon (2019) arrived at similar findings. They concluded that feeling safe, as in psychological safety, is defined as not feeling judged by other participants and facilitators, which allows participants to focus on engaging in the SBL (Hsiang-Te Tsuei et al., 2019).

### 5.5. Strengths, limitations, and future directions

None of the researchers were involved in designing the ISBL scenarios in this present study, but they did set the inclusion criteria. This could have led to limitations if we had intended to measure self-efficacy. Still, since we wanted to explore and gain data from a wide variety of experiences and did not want to influence as an external factor, we assume that this strengthens this study's results.

In conducting focus group interviews the moderator has to guide the discussion and establish dynamic interaction amongst the group of participants. This supports a sharing dialogue in the focus group as a suitable method of obtaining knowledge in situations where several people interact, as in an ISBL Krueger & Casey (2015). Since we knew that the moderator's role is demanding and to ensure that the discussion included all the participants in each focus group interview, we included one assistant moderator. The moderator and the assistant moderator were the same two individuals performing these roles throughout the study. This added value increased their alertness and supported them in inspiring participants to share their experiences.

In the present study, the participants were recruited by their teachers. This could have affected their decision to participate. Thus, the participants were informed that their decision would have no negative consequences for them.

Future directions for studies are to explore and measure if self-efficacy development through ISBL in higher education can affect students' learning outcomes when entering their clinical practice.

This is a study of limited size; therefore, findings cannot be generalized. However, they expand the understanding of how inter-professional simulation-based learning contributes to the development of self-efficacy.

## 6. Conclusions

Our findings confirm that Bandura's four sources, mastery experience, vicarious experience, verbal persuasion and social influence, and physiological response to the performance, are essential in ISBL. These sources can contribute to developing perioperative nursing students' self-efficacy in communication, interdisciplinary collaboration, and prioritisation tasks in acute situations. As we know that

Bandura claimed that the four sources interact with each other, it seems important to promote and include all the sources in an ISBL scenario. Since much of the results reflect not only the scenario but the entire ISBL (preparing, designing, running scenario and debriefing). Furthermore, there are several critical conditions to be considered regarding each of the four sources in order to increase the development of self-efficacy in ISBL. It concerns participants' experience of reality, the level of difficulty in the ISBL case, and whether participants who observe have enough competence in the ISBL context. The facilitator needs competence in simulation pedagogy and in the context of the ISBL case. Furthermore, we need to highlight the importance of equally including all the professional groups that are represented to develop collective efficacy. Positive stress is useful to perceive how they as future perioperative nurses will manage stressful, acute situations in clinical practice. Participants' unnecessary stress has to be prevented through better preparedness, taking a role in the scenario within their profession, experiencing a realistic ISBL situation, and not feeling like they are being assessed. A well-designed and well-prepared ISBL case can contribute to the development of self-efficacy in communication, interdisciplinary collaboration, and prioritising tasks in acute situations .

## 7. Relevance to clinical practice

The present findings further expand the knowledge regarding Banduras' (1997) theory about self-efficacy beliefs and its significance in an ISBL. Educators and facilitators can use this knowledge and design ISBL to promote learning experiences that increase self-efficacy beliefs. Building up and strengthening self-efficacy beliefs in students can result in more motivated students who work harder, persevere longer, and have fewer unfortunate emotional reactions when they encounter difficulties than those who lack belief in their capabilities Bandura (1997). Additionally, ISBL requires that all relevant professions are included in a team, to create collective efficacy, leading to more motivated and robust team behaviour and functioning.

## Authorship

All authors Hege Kristin Aslaksen Kaldheim, Mariann Fossum, Judy Munday, Johan Creutzfeldt and Åshild Slettebø fulfil the journal's authorship policy and have approved the final text.

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## Declaration of Competing of Interest

The authors reported no declaration of interest.

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