2022, vol. 7, e3646
boap.uib.no/index.php/nordvei

NORDVEI
Nordisk tidsskrift i veiledningspedagogikk

Synchronous video-based supervision and feedback in nursing education – a scoping review

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Abstract

The purpose of this review was to identify studies and experiences reporting with triadic synchronous video-based supervision (TSVBS) in nursing education. It is important for nursing students to be supervised by preceptors and academic teachers during their practicum. There are some challenges to performing in-person supervision involving those three parties, like long travel distances and the restrictions caused by the Covid-19 pandemic. TSVBS may be a solution. There is, however, limited knowledge about TSVBS in nurse education. We performed a scoping review focusing on TSVBS to provide an overview of the existing publications on the approach. Only six studies were found describing the use of TSVBS, all of them relating to nurse education. No studies evaluating the effect of TSVBS were found. Instead, the studies only compared the cost-effectiveness of TSVBS with in-person supervision. The supervisory relationship between the three could also not be separated from a more general teacher-student relationship.

Keywords: Nursing education, cyber supervision, pedagogical innovation, nursing student, clinical practicum, feedback assessment.

Introduction

In Norway, as in comparable counties, it is a goal that people can receive higher education, independently of geography and life situation (Meld. St. 5 (2019-2020); Meld. St. 14 (2019-2020)). In nursing education practice is a systematical training that takes place in authentic environments under the supervision of a person with a relevant profession, often a nurse. Decentralization can help make education more accessible independent of where people live, while other forms of flexible facilitation can increase the availability and quality of the diversity of students (op.cit). When many students are in need for practice at the same time, it is difficult for the educational institutions to find sufficient internships with good quality. Larger educational institutions in central areas, flexible nursing education and decentralization will challenge the need for internships far from the educational institution and push forward the need for distance supervision for students in their practicum. Due to the Covid-19 pandemic outbreak,

Published: 28.06.2022

DOI: https://doi.org/10.15845/ntvp.v7i1.3646

synchronous video-based supervision between practicum and academic teachers was adopted "overnight" by several educational institutions, but naturally with little time for preparation and planning. The pandemic has affected the need for distance learning and distance supervision for students in their practicum and may change the strategies for distance education in the future. In this scoping review we search for the main characteristics and results of existing research and publications on synchronous video-based supervision in nursing education. The research question guiding the inquiry was: What type of research has been published, what kind of evidence has been identified, and can any research gaps be described of existing research on synchronous video-based supervision in nursing education?

The importance of Practicum

Competence is a primary goal for all education (Biesta, 2009). To develop competence in care in authentic environments is central for nursing education. There is a high focus on authentic practice environments, called practicum, in these professions' curriculum. Practicum is an arena for skills training and knowledge development as well as an arena for socialisation and familiarisation with the identity of the profession (Biesta, 2009; Järvinen et al., 2018). Learning in collaboration with the professionals in the practicum is a combination of the exchange of practice of practical skills, experiences, understandings, and reflections. In addition, practicum is also an arena for students to develop their own professional identity (op.cit) and is also a recruitment channel from both students' and the practicums (Kunnskapsdepartementet, 2021).

The terminology for practice varies, such as practice-based experiences integrated in higher education curriculum, work-integrated learning (WIL), internship and practice (Helseth et al., 2019, p. 8).

Supervision from both academic teachers and preceptors is therefore significant to securing the inclusion of all these aspects. The terminology for the practice learning supervisors varies globally and the different professions also use different terminology. In the health profession, Preceptor is a globally preferred terminology used to describe somebody who offers holistic, one-on-one learning support either when introducing a registered nurse into their healthcare organization or when holistically supporting the learning of a nursing student (Hart et al., 2019; Ward & McComb, 2018).

Practicum processes and challenges

There is a need to communicate and cooperate about practicum experiences and to relate the experiences to both theory and established practicum. Cooperation between students, preceptors and academic teachers is critical during practicum to achieve learning outcomes through reflection and feedback (Gustafsson et al., 2015; Hattie & Timperley, 2007; Löfmark et al., 2012). Students' reflections can take place during three phases: planning, action, and after-action. There are, however, some challenges to conducting supervision. Students may experience a lack of continuity or limited contact with academic teachers because of large geographical distances, travelling and other logistical barriers (Alton et al., 2018; McCoy, 2018; McDonald et al., 2018).

This can make it difficult to accomplish cooperation between students, preceptors, and academic teachers (Newton et al., 2016; Sundler et al., 2019). Challenges related to climate, environment and sustainability are also factors that may limit meetings in person. In addition, the recent worldwide pandemic has resulted in restrictions to meetings in person and thus excludes students from being supervised by teachers and preceptors in a timely way.

Digital tools like online discussion forum, mobile devices, e-book systems, or video-based supervision is some examples that may solve some of these challenges (Hart et al., 2019; Strandell-Laine et al., 2018). In this study we focus on the experiences on synchronous video-based supervision in nursing education as one of these tools. Technology alone cannot improve learning (Tamim et al., 2011). The interactions between academic teachers, students, methods and technologies (Berney & Bétrancourt, 2016; Tamim et al., 2011) as well as the digital competence of academic teachers and students are significant factors (Howard et al., 2016; Røkenes & Krumsvik, 2014).

Synchronous video-based supervision in higher education

The question is thus whether synchronous supervision can replace some or all the in-person meetings between students, academic teachers and preceptors. Synchronous supervision takes place in real time and involves a combination of chat, audio file sharing and video file sharing, most often through digital programs (Bender & Dykeman, 2016). Former research on synchronous video-based supervision in health professions shows that such use of communication has been beneficial in providing supervision to clients (e.g., (Brandoff & Lombardi, 2012; Nordgreen et al., 2018). Video-based feedback has been widely used to support learning in education and professional development (Fukkink et al., 2011; McDonald et al., 2018). In student-teacher practicums, academic teachers use video-based supervision and feedback to respond through screen-capture technology (Mathisen, 2012) and synchronous video-based supervision (Mathisen & Bjørndal, 2016; Wergeland & Mathisen, 2009).

However, most of the research on synchronous video-based supervision is on communication between two participants (e.g., teacher and class/student or patient and therapist). We have little knowledge about how learning is affected using digital tools when preceptors and academic teachers simultaneously supervise students – an approach called triadic supervision.

The scientific contribution of this article

In this context, a good experience- and knowledge base can give guidelines for choosing technology tools that meet higher demands for efficiency, quality, and sustainability in learning and at the same time uncover the need to adapt the required technology and provide guidelines for digital tools needed to achieve best possible quality in education. Video-based supervision takes place at the intersection between technology and relationships. By establishing a form of communication with a high degree of synchronisation, non-verbal and para-verbal communication, the communication between supervisors and supervisees can approximate in-person interaction (Wergeland & Mathisen, 2009).

Therefore, it is important to develop a knowledge that have impact on present and future synchronous video-based supervision. The contribution of this scoping review is that it will provide a basis for further studies through our description of the as-is situation in the field of triadic synchronous video-based supervision (TSVBS) in higher education.

Aim

The aim of this study was to identify studies and experiences reporting with triadic synchronous video-based supervision (TSVBS) in nursing education during practicum. The research question is: What type of research has been published, what kind of evidence has been identified, and can any research gaps be described of existing research on synchronous video-based supervision in nursing education?

We define TSVBS in this study as supervision using live video between a student and two supervisors: a) the preceptor and b) the academic teacher from the educational institution.

Methods

To map current research and identify gaps we choose to conduct a scoping review. The aim of a scoping review is to "identify nature and extent of research evidence" (Grant & Booth, 2009, p. 95) when "a body of literature has not yet been comprehensively reviewed" (Peters et al., 2015, p. 141). The value of scoping reviews to evidence-based health care and practicum lies in their ability to incorporate various types of literature that are not limited specifically to research studies (Peters et al., 2021, p. 5) such as reports and other policy documents to map complex topics. A key difference between scoping reviews and systematic reviews is that in terms of a review question, a scoping review will have a broader "scope" than traditional systematic reviews with correspondingly more expansive inclusion criteria (Munn et al., 2018, p. 5) This scoping study is specifically designed to identify gaps in the evidence base where no research has been conducted. Scoping review may also summarize and disseminate research findings in specific areas of inquiry (Arksey & O'Malley, 2005). Therefore, a scoping review can provide an overview of the present

publications related to triadic synchronous video-based supervision for nursing education during practicum and help to identify possible knowledge gaps and different concepts and approaches. The methodological framework adopted for identifying literature in this scoping review is based on the stages presented in Arksey & O'Malley (2005).

Protocol and registration

The study protocol for this scoping review was registered in the Cristin – Current Research Information System in Norway (https://app.cristin.no/projects/show.jsf?id=598075). The PRISMA Extension for Scoping Reviews checklist was used to guide the reporting of this review (Tricco et al., 2018).

Eligibility criteria

Study design

As the method used was a scoping review, there were no limitations pertaining to study design. Any quantitative, qualitative, or mixed methods designs were included.

Population

The current review considered studies involving clinical practicum as a part of the educational experience toward a degree in health care; such studies have been conducted in university degree programs such as nursing, occupational therapy, physiotherapy, medicine, psychology and social work. Thus, the population includes students, preceptors and academic teachers within health care training.

Types of intervention and comparison

Any studies involving TSVBS were considered for this stud which includes supervision using live video between a student and two supervisors.

Outcome

All outcomes related to learning and experiences in the supervision of students by preceptors and academic teachers were included in the study.

Information sources

The information sources used for the searches were the following electronic databases: ERIC, CINAHL, Academic Search Elite and Education Source (all at EBSCOhost); MEDLINE, PsycINFO and EMBASE (all at OVID); and Proquest, Science Direct and Campell Collaboration systematic review. There were no limitations on language, date of publication or publication types.

Reference lists from all studies were read, and full texts were checked for further references. Citation searches were also done for some authors who have done studies on synchronous supervision. Finally, Google Scholar was searched using the main search terms.

Search

The main search was performed in March 2020. An updated search was done in June 2021 together with citation searches of the included articles. The main keywords were 1) search terms relating to supervision combined with 2) words relating to practicum, practice and preceptorship and 3) words expressing the student population (See Appendix 1 for the complete search strategy).

Selection of sources of evidence

All the search results were collected in Endnote (X8.2 Update, 2018). After the automated and manual duplication control, the references were imported to the screening tool Rayyan (https://rayyan.qcri.org/).

Two of the researchers had planned to independently screen the titles and abstracts using Rayyan (https://rayyan.qcri.org/) to identify potentially eligible studies. Because of unforeseen circumstances,

one of the researchers had to withdraw from the study on short notice. The first author (NVS) then screened all references alone. To calibrate the first author´s screening process, two control screenings were performed. In the first round, 20 references were independently screened by the third author (IH). An unknown number of articles that were selected for inclusion after being read in full by the first author were chosen and screened by the third author, who volunteered to undertake the screening. No disagreement was found between the two authors. The same procedure was repeated with 200 references. The third author screened the titles and abstracts; afterwards, the 200 references were assessed together. Again, no disagreement was found, and it was concluded that no studies were missed from these samples. Therefore, it was decided that the first author could do the full screening alone.

Data charting process

The mapping comprises a presentation of the included studies, the focus of each study, and whether the studies considered learning and competence, supervisory relationships and/or technology competence and effectiveness.

The identification of gaps from systematic reviews is one way to move toward evidence-based research (Lund et al., 2016). In this regard, using a framework promotes an explicit and systematic method for identifying research gaps from systematic reviews (Robinson et al., 2011). We believe that this framework is also useful for a scoping review.

We applied the framework of Robinson et al. (2011) and included two elements: (1) the characterization of the gaps and (2) the identification of the reason(s) for each research gap.

Mapping of the Studies

Two authors (NVS & KR) independently extracted the data. The results were then compared and discussed until consensus was reached between the two researchers. The following data were extracted: name of author(s), year of publication and country for first author, aim of the study, setting, population and sample size, methods used, type and description of the intervention and key findings. That information then functioned as a basis for further mapping/charting.

Results of the research (2000–2019)

The result of this scoping review search for answer on the research question: What type of research has been published, what kind of evidence has been identified, and can any research gaps be described of existing research on synchronous video-based supervision in nursing education?

Selection of sources of evidence

The searches yielded 12223 published papers. After an automatic and manual duplication check, 8546 unique references were screened. After the screening process, the full text of 75 articles were read. Sixty-nine were excluded based on the content of the full text; thus, six publications were included (Figure 1).

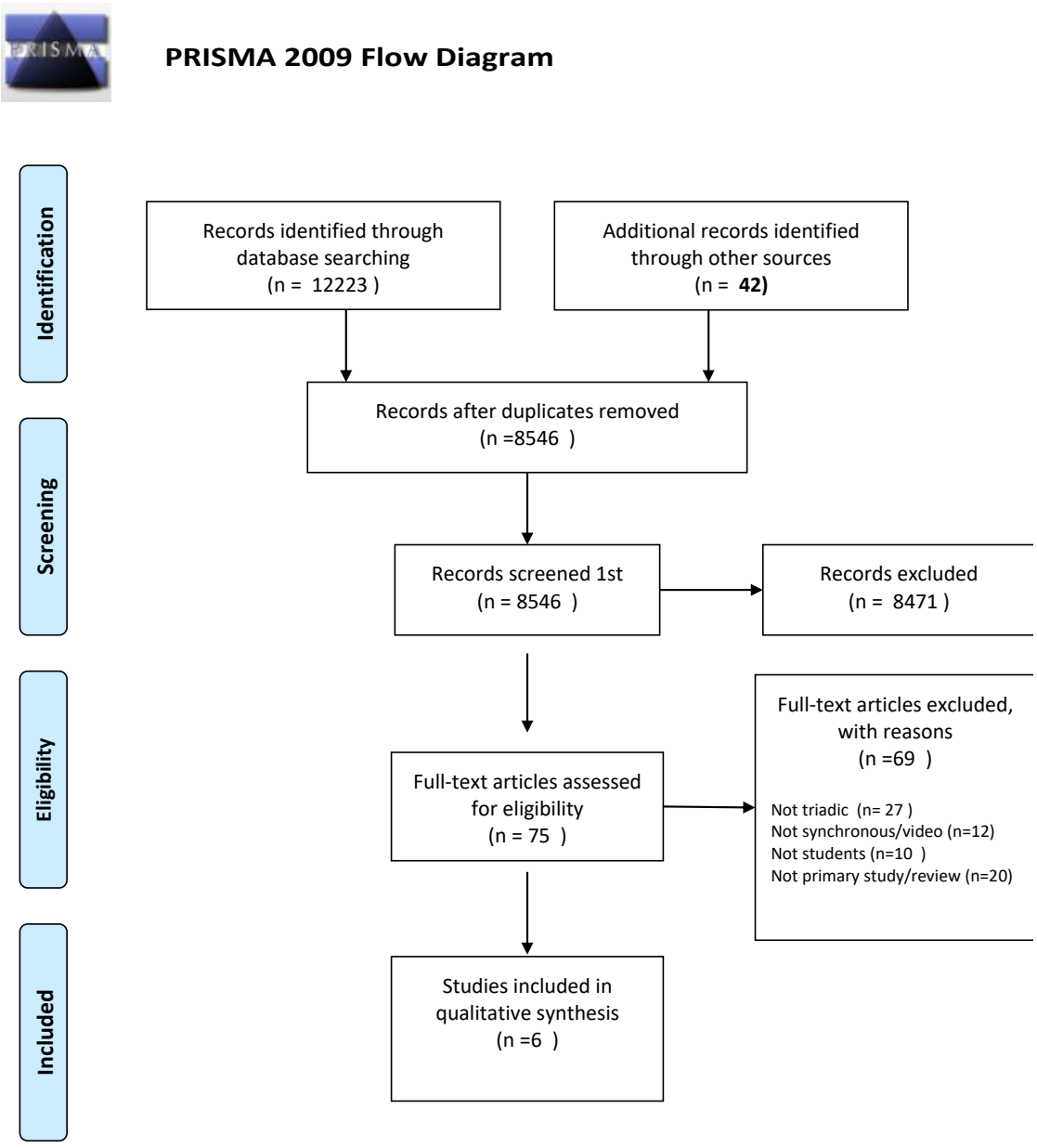

Figure 1. PRISMA flow diagram. Adapted from "Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement," by D. Moher, A. Liberati, J. Tetzlaff and D. G. Altman, 2009, *PLoS Medicine, 6*. CC BY.

Characteristics of sources of evidence

Six publications published between 2013 and 2020 were included in this review (See Table 1). Four of them are peer reviewed articles (Alton et al., 2018; Dolan & Willson, 2019; Hart et al., 2019; Strandell-Laine et al., 2018), and two are reports (Hilli et al., 2012; Krull, 2015). Three of the included publications (Alton et al., 2018; Hart et al., 2019; Strandell-Laine et al., 2018) are publication that are quality-assessed using the Risk of Bias tools (see Table1).

Table 1	**Included studies**						**Review and evaluation by CASP**			
Author / Year / country	**Aim**	**Setting**	**Population / Sample size**	**Methods used**	**Intervention/tools**	**Key findings**	*Research background, purpose and theoretical framework**	*Research design***	*Research validity and ethics****	*Results*****
Alton and Wilder/2018/USA	Decrease cost and faculty travel time.	Site visits were conducted by school of nursing faculty with real-time observation of the nurse practitioner student-patient encounter. FaceTime meeting with students, preceptors and patients.	Nurse students, preceptors and teachers. Sample size unknown	Pilot study with model of improvement framework	FaceTime Compare with in-person costs	Students, preceptors and faculty members found iPads easy to use. Students reported some password sign-in problems.	+/+/+/+	+/+/+/+	+/+	+/?/+/-
Dolan and Willson/2019/ USA	Facilitate students' growth by collaborating with community nurses and health care leaders. Develop and evaluate a triad-mentoring model.	Distant learners participated in real-world learning experiences provided by academic-clinical partnerships.	Nursing leadership and administration students, nurse leader and faculty member. Sample size unknown.		Face-to-face meetings and video conferences (most frequently used).	Course delivery through the mentoring model received positive evaluations from both the students and leader mentors.				
Hart, Bird and Farmer/2019/ United Kingdom,	Test the idea that online collaborative learning solutions (e.g. virtual classrooms and web conferencing tools) have the potential to ameliorate resource pressures.	The students and their preceptors were supported by an HEI nursing lecturer via Collaborate over an 11-week placement period.	Eight second-year mental health nursing students (three males and five females) as well as their preceptors and nursing lecturer	A pilot study	Blackboard Collaborate™ Compared with in-person contact.	Collaborate was good training and the opportunity to practice newly learned skills	+/+/+/-	+/+/+/+	+/+	?/-/-/+/-
Hilli, Nedergård and Nyman/2012/ Finland	Encourage regular student-teacher contact that enables reflective conversation and that prevents isolation and loneliness. Promote collaboration between college and work life. Improve information flow.	Students in distance clinical practice.	23 nursing students	Action research. Students (and preceptors later in the study) answered two questions at the end of practicum by e-mail or paper. A quantitative content analysis was also conducted.	Synchronous video-based supervision with the triadic team; the nursing student, preceptor and academic teacher used Adobe Acrobat Connect Pro Meeting	Students reflected on events they had been involved in, helping them to focus on important aspects of clinical practice.				

Table 1	**Included studies**						**Review and evaluation by CASP**			
Author / Year / country	**Aim**	**Setting**	**Population / Sample size**	**Methods used**	**Intervention/tools**	**Key findings**	*Research background, purpose and theoretical framework**	*Research design***	*Research validity and ethics****	*Results*****
Krull/2015/ USA	Reduce time and travel expenses.	Academic teachers talked with preceptors about their students, evaluated students' progress and evaluated the clinical sites to ensure they were appropriate.	Nursing students, preceptors and academic teacher	Report own experience of cost reduction.	FaceTime® used by iPad	The academic teacher saved more than 30 hours of travel time and travel expenses. Easy to use and was secure and cost efficient.				
Strandell-Laine, Saarikoski, Loyttyniemi, Meretoja, Salminne, , Leino-Kilpi,/2018/. Finland	Improve competence and self-efficacy of students and the quality of the clinical learning environment.	A five-week internal medicine or surgical clinical practicum in one of the study hospitals, being at least a second-year student before registration.	Nursing students	A parallel-group randomized controlled trial. Intervention and control group (parallel group RCT). Survey.	Students and teacher cooperated during clinical practicum using the mobile application Study@CampusPro	Competence and self-efficacy showed no significant between- group differences in mean improvements	+/+/+/+	+/+/+/+	+/+	+/+/+/+/+/

* *the contemporaneity of the background/description of and study purpose, definition of concepts and research questions*
** *the description of method, sampling, data collection and analysis methods*
*** *reporting on validity and reliability as well as research ethics*
**** *research questions were answered, the results are compared with previous research, limitations of the study are described, conclusions are logical, further research needs are described*

\+ Articles that explicitly discuss items listed in the column headings
? Unclear whether the articles explicitly discuss items listed in the column headings
\- Articles that do not explicitly discuss items listed in the column headings

Knowledge gaps

The results revealed several knowledge gaps pertaining to TSVBS. First of all, few studies describe the use of TSVBS, as we only identified six studies. When applying the characteristics of the six studies to the framework of Robinson et al. (2011), we identified knowledge gaps in all four areas (population, intervention, comparison, and outcomes; see Table 2).

Table 2. Identified knowledge gaps.

Population	Interaction	Comparison	Outcome
Only nurses	No test of video No clear recommendations for the outline of video supervision	No clear description of the in- person supervision	No suggestions for pedagogical outcomes Only cost-benefit and time aspects

In addition, all the studies used technological tools. Four used already known tools (FaceTime, Adobe Acrobat Connect and Blackboard Collaborate), and one used an app (developed for the study. One did not describe what kind of tools were used (Dolan & Willson, 2019). All studies took place during the nurse education practicum. The content of practice and levels of education were also different (bachelor students, continuing education). None of the studies referred to the ongoing pandemic situation.

Impact of using triadic synchronous video-based supervision

The rationale for and advantages of using TSVBS were associated with its usefulness, such as academic teachers spending less time travelling to meet students and preceptors and the One study (Krull, 2015) estimated that teachers saved more than 30 hours of traveling time by using TSVBS. The cost-effectiveness of TSVBS was mentioned in three of the studies (Alton et al., 2018; Hart et al., 2019; Krull, 2015), and one study did a cost-benefit analysis comparing TSVBS with traditional supervision, estimating a reduction of nearly USD 300 per student visit (Alton et al., 2018). Moreover, one study (Hart et al., 2019) found that participants reported that video supervision was easier to organize compared to in-person meetings as video meetings were considered more formal and committed. Students, preceptors and academic teachers reported the effectiveness, decreased workload and improved resource utilization of TSVBS, at the same time ensuring quality of education (Alton et al., 2018). A more practical everyday life for all the three parts in TSVBS.

Technology competence and tools

The technology competence of students, preceptors and academic teachers was found to be a significant factor. One of the barriers hindering staff from implementing communication tools based on technology was initial feelings of wariness about using technology (Hart et al., 2019). Good training and the opportunity to practice newly learned skills as soon as possible were effective ways to reduce worries about using of technologies (op.cit). Students found that it was easy to use technology in supervision, if the technology worked as intended (Hart et al., 2019). Therefore, the quality of the internet connection was another significant factor, and poor Wi-Fi- signals and other technical problems (e.g., sound freezing, picture quality) complicated the supervision for some (Alton et al., 2018; Hart et al., 2019; Hilli et al., 2012).

Outcome

We found no studies evaluating the effect of TSVBS; they only assessed its cost-effectiveness by comparing TSVBS with in-person triadic supervision. In fact, no studies distinguished between TSVBS and other online contact between students and teachers. It is therefore not possible to distinguish outcomes for TSVBS with other outcomes (e.g. reflection, competence and self-efficacy (Hilli et al., 2012; Strandell-

Laine et al., 2018), significant learning outcomes and satisfaction with the clinical learning environment (Strandell-Laine et al., 2018).

Supervisory relationship

Like the outcome, a major limitation related the impact of TSVBS on students, preceptors and academic teachers is that the triadic relationships were not separated from the teacher-student relationship. In addition, the focus and number of meetings differed in the included studies. One study used TSVBS one time (Hilli et al., 2012), and the rest presumably used it several times. Therefore, the impact of TSVBS on the relationship between the three parties is unclear. That said, most of the students in the studies appreciated the environment and conversations with the academic supervisor via synchronous video-based supervision, and they felt that communication flowed easily.

On the other hand, both students and preceptors expressed that video-based collaboration could not replace the support provided by actual visits and that person-to-person contact was needed (Alton et al., 2018; Hart et al., 2019). Such situations were not exemplified.

Discussion

The aim of this scoping review was to map the current research related to triadic synchronous video-based supervision and to identify possible knowledge gaps in the field of professional education.

The most important finding is the lack of research in this area. Only six studies were identified despite a thorough literature search. In addition, TSVBS was found only in one population – namely, nurse education.

Articles and reports describing the use of synchronous video-based supervision and different audiovisual tools as a part of practice supervision were found among other professional studies, but none where TSVBS was applied during online distance learning (dos Santos & Cechinel, 2019; Körkkö et al., 2019; Mathisen & Bjørndal, 2016; Teo et al., 2015). Still there has been surprisingly little research on triadic synchronous video-based supervision for nursing students in practicum, even supervision using live video between a student and supervisor is common and is used in many contexts.

The pedagogical supervision and assessment with the preceptor and academic teacher are an important part of students' professional development. Still, the supervision situation is vulnerable, and the supervisory relationship is important for learning and the student's experience of the practical training. If the supervisory relationship is good, the supervision can also be positively affected. The dialogue in the supervision is based on humanistic values such as respect, equality, and recognition (Tveiten & Iversen, 2018, p. 18) and is necessary to create good learning conditions in the dialog between the student, preceptor, and supervisor. Even the impact of TSVBS on the relationship between the three parties in our finding has major limitations it is interesting that most of the students appreciated the meetings with TSVBS, and they felt that communication flowed easily (Hilli et al., 2012). TSVBS may be useful in conditions were both students, preceptor an academic teacher know the students well, and may have some meetings in-person. In our findings both students and preceptors expressed that video-based supervision could not replace the support provided by actual visits and that person-to-person contact was needed (Alton et al., 2018; Hart et al., 2019). We must not underestimate the need for psychological safety with the use of synchronous video-based supervision. Psychological safety is defined as the feeling of fearlessness of the consequences of mistakes and confidence in the safety of interrelationships (Park & Kim, 2021, p. 2; Turner & Harder, 2018) and is possible an important issue for the supervisory relationship.

The role of preceptor and the academic teachers are complex with both supervision and assessment. None of the included studies had a focus on this complex situation. It is a challenge for all parts when the student does not live up to the expectation and the supervisors are unsure whether the student is mature enough or suitable for nursing. In situations where the students are in danger of not passing their practicum, it is necessary to ensure that the supervisors can facilitate appropriate supervision (Fagerli & Femdal, 2021). In such cases, these meetings will be particularly vulnerable and it should be questioned whether TSVBS is a suitable tool. On the other hand, TSVBS can help increase the availability of the

academic supervisor and thus allow more meetings than if one were to meet at traditional actual visits and person-to-person contact (Alton et al., 2018; Hart et al., 2019; Krull, 2015). In this way, more frequent meetings can contribute to strengthening the relationship between the three parties. Although the possibility of more frequent meetings is good with the TSVBS, it is nevertheless a challenge that we have little knowledge on how TSVBS affects the quality of the supervision. All students are vulnerable by virtue of their assessment (Tveiten & Iversen, 2018). We need knowledge about the extent on whether TSVBS is suitable for supervision for students who for various reasons are particularly vulnerable in the supervision meetings.

It is also needed to see synchronous video-based supervision in a pedagogical context by investigate the pedagogical arguments for digital tool in practicum. Good learning opportunities should be facilitated for both academic teachers and preceptors in how TSVBS can be used and what opportunities this digital tool can contribute to. In addition, training in the use of TSVBS is one of the strategies. Another way who might be interesting is to strengthen the preceptor's competence on supervision giving the preceptors a supervision on their supervision in their use of TSVBS. Good guidelines for users can also help to make it clear which limitations it has and can contribute to a greater degree of satisfaction with its use, and at the same time a clear framework for when it suits TSVBS and when it is not suitable.

Health care institutions and other internships for students is often busy, there is a shortness of nurses, and the nurses share the task of having the role of preceptor. Studies have shown that supervisors often feel uncertain in the supervisor role, and that supervising requires a lot of time and involves great responsibility (Aigeltinger et al., 2012). It is conceivable that TSVBS can solve some of the time pressure. The cost-effectiveness of TSVBS is accentuate in the studies, especially for the academic teachers spending less time travelling (Alton et al., 2018; Hart et al., 2019; Krull, 2015) and easier to organize the meetings (Hart et al., 2019). However, there is a risk of focusing on economy and efficiency instead of quality. TSVBS may be an effective and good tool but can also be misused in the name of efficiency. Therefore, supervisors must be engaged in both professional and methodical supervision and the use of relevant tools for pedagogical supervision in practicum. It is also conceivable that the combination of time pressures, uncertainty in the role of supervisor and new digital tools for supervision creates more stress for the supervisor. If so, this could affect how the relationship creates in practicum and maybe the quality of the supervision.

We should be aware that TSVBS can be a good tool for responding to the challenges of large geographic distances and the need for education in rural areas. It may also be a suitable tool for making it easier to interact with other actors to expand the possibility for interdisciplinary reflection and learning cooperation. We need more research and especially after the pandemic where we have recently experienced that TSVBS is the "new normal".

There is surprisingly little focus on supervisory relationship despite the importance of it in TSVBS. Based on our findings it is therefore not possible to find a conclusion. Our findings shows that there are several gaps in our knowledge on TSVBS. need studies that focus on how the supervisory relationship between student and supervisors is affected using TSVBS and in what way one can strengthen psychological safety in students who receive supervision through TSVBS.

The technology competence of students, preceptors and academic teachers was found to be a significant factor in our findings (Hart et al., 2019). Typical for young students is that they are experienced technology users, so called digital natives (Seemiller & Grace, 2017). But more important than the fact that everyday students use a lot of technology is that technology has created new forms of learning, through interactive learning and a desire for greater variation in learning methods (Lillejord et al., 2017). Even young students seem to be digital natives there is an expectation that the students have digital competence, be able to assist in the development of and use suitable technology at both the individual and system level (Forskrift om felles rammeplan for helse- og sosialfagutdanninger, 2017). It is therefore necessary that the academic teachers and preceptors are not prevented by barriers such as wariness about using technology (Hart et al., 2019).

After a long pandemic period with physical restrictions on travelling and meetings we would expect some more research done on learning outcome and the relational consequences of triadic synchronous video-based supervision. There is reason to believe that the experiences made during the pandemic will trigger more research on these topics. One example is the ongoing research on technology-supported guidance to increase flexibility, quality and efficiency in the clinical practicum of nursing education (Nes et al., 2020). The Covid -19 pandemic challenged a need for more flexibility in distance follow-up of students in their practicum. It is also reason to believe that the Covid-19 pandemic may has changed the use and the view of synchronous video-based supervision in higher education and maybe technology–supported guidance models. The pandemic has made it necessary to rethink good educational and relational tools, and there is reason to believe that supervision in near future is organized in different ways and maybe with different digital tools, such as in online discussion forum, e-book system in conjunction with supervision from the preceptors and academic teacher (Nes et al., 2020; Zlamal et al., 2021).

It is possible that the Covid- pandemic will also help to reinforce an understanding that triadic video-based supervision not only contributes to the optimization of time for both the supervisors and the student because one can limit travel time, but that TSVBS is also inclusive as the technology makes it possible to participate in supervision despite own or children's illness, long travel distances or otherwise. The disadvantage of such opportunities is that in the event of illness combined with the obligation to provide supervision for students, one can contribute to a deterioration in the need for self-care. This is a topic that should be given a place in the further research on TSVBS.

We assume that there may be a correlation between the physical distance and attitudes towards TSVBS and that there will be a greater likelihood that large distances between practice, campus and student's homes will contribute to a positive attitude towards synchronous video-based supervision, although we have not found any research that has highlighted on that topic. Such a pragmatic approach is understandable, although in the education of nurses one should have quality in supervision as focus. Therefore, it would be an important contribution to do studies on consequences on the quality of supervision using TSVBS, such as competence, reflection, self-efficacy, and psychological safety.

Conclusion, implications for practice and further research

The present review identified a knowledge gap regarding outcomes and supervisory relationships related to the use of TSVBS. Only cost-benefit outcomes were explicitly identified. The reason for this is that other outcomes and supervisory relationships were not separated assessed from the programs.

It surprised us that we found only six studies and that the use of synchronous video-based technology has not been commensurate with the growth in online programs and general use of technology within the field of student supervision (Inman et al., 2019). Because of the lack of research in TSVBS there is no basis for concluding. The fact that all the studies in this review were published between 2015 and 2020 may indicate that TSVBS is a topic of growing interest, specifically in nursing education. Therefore, it is possible that the study of TSVBS will increase, especially considering the ongoing worldwide pandemic and considering the growing use of TSVBS. Moreover, climate change and challenges related to global warming are other factors that may increase the use of TSVBS.

This kind of practicum supervision will not necessarily completely replace in-person support, even as all involved partners become more confident with the technology. It is important to have a discussion involving teachers, preceptors, and students about when to use TSVBS and when not to. This discussion ought to be from a pedagogical and not a cost-benefit perspective. Furthermore, the research on the use of TSVBS is limited, and we need more research, especially on supervisory relationships and outcomes beyond cost benefits.

We do also hope that this review can be seen as an inspiration for further research in triadic synchronous video-based supervision or in designing new technology-supported supervision.

Availability of data and materials

All data generated from this study will be included in the published scoping review and is also available on request.

Implications for practice research

We need theories that justify research on the use of technology in learning in higher education. We also need studies that include ethics in the use of technology as tools in education and in supervision of students in their clinical practice. There will be a need for research in how TSVBS can affect learning and reflection in TSVBS. Studies that highlight the supervisory relationship in use of TSVBS will be needed. We may also ask can use of synchronous video-based supervision situations make it easier to interact with other actors who do not normally participate in this form of supervision, such as doctors or other professional groups, to achieve interprofessional collaborative learning?

Authors' contributions

All authors collaborated on the protocol, and NVS wrote the first manuscript on the protocol. NVS and IH performed the literature searches, read abstracts, and reviewed articles. All authors read and critically appraised the included studies. IH and HL wrote the first manuscript on the method, and NVS wrote the first manuscript on the results, discussion, and conclusion. HL and KR made substantial revisions. The latest revisions are made by NVS. All authors critically revised the manuscript and approved the final version.

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