

REVIEW

Ethics of care in technology-mediated healthcare practices: A scoping review

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Abstract

Background: Introducing new technologies into healthcare practices may challenge professionals' traditional care cultures. The aim of this review was to map how the 'ethics of care' theoretical framework informs empirical studies of technology-mediated healthcare.

Method: A scoping review was performed using eight electronic databases: CINAHL with full text, Academic Search Premier, MEDLINE, the Philosopher's Index, SocINDEX with Full Text, SCOPUS, APA PsycInfo and Web of Science. This was followed by citation tracking, and articles were assessed against the inclusion criteria.

Results: Of the 443 initial articles, 18 met the criteria and were included. We found that nine of the articles used the concept of 'ethics of care' (herein used interchangeably with the terms 'feminist ethics' or 'relational ethics') insubstantially. The remaining nine articles deployed care ethics (or its equivalent) substantially as an integrated theoretical framework and analytical tool. We found that several articles suggested an expansion of ethics of care to encompass technologies as part of contemporary care. Furthermore, ethics of care contributed to the empirical research by recognising both new relationships between patients and healthcare professionals as well as new ethical challenges.

Conclusion: Ethics of care is sparsely used as a theoretical framework in empirical studies of technology-mediated healthcare practices. The use of ethics of care in technology-mediated care brings new dilemmas, relational tensions and vulnerabilities to the foreground. For ethics of care to be used more explicit in empirical studies, it is important that it is recognised by research community as an adequate, universal ethical theory.

KEYWORDS

care rationality, empirical research, ethical dilemmas, ethics of care, feminist ethics, healthcare, relational ethics, scoping review, technologies, technology-mediated healthcare

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INTRODUCTION

The implementation of technologies in healthcare practices is increasing and becoming progressively diverse. When new technologies are introduced, health professionals' long-standing relationship-based and traditional cultures of caring ethics may be affected, transformed or challenged, leading to new ethical dilemmas [1, 2]. With potentially changing healthcare practices, services and policies, we want to understand how theories of ethics of care inform empirical research on technology-mediated healthcare. As Korhonen et al. [3] have established, using technology in care aligns with the 'essence of caring science from [an] ethical dimension' (p. 874), as care technologies are fundamental to providing good care.

Positioned within the larger field of ethics, *ethics of care* was developed as an alternative to moral principles and moral reasoning. Originating from the work of Carol Gilligan [4] and Nel Noddings [5], ethics of care arose from moral concerns bound to basic human conditions like vulnerability and dependency, highlighting our reliance upon each other [6–8]. Several reviews have provided an overview of the origin and development of ethics of care [9, 10]. Carper, as cited by Sarvimäki [11], claimed that ethics of care, as a normative theory, is a criticism of dehumanisation and depersonalisation of the patient by healthcare providers. Eriksson formulated ethics of care as follows: 'I was there, I saw, I witnessed, and I became responsible' [12, p. 70] (our translation). This speaks to the situational, relational and holistic view of care and ethics. In a recent scoping review of how healthcare professionals use care ethics in practice, Buchanan et al. [13] presented a definition for healthcare practice:

Care ethics recognizes that care is a universal human experience. Care ethics is founded on relationship, based on presence, trust and respect, forged on knowing the person at the centre of care. The practice of care is holistic, is attentive, responsive, responsible and competent. The richness and complexity of the individual socioemotional context is considered, and the caregiver equally values other ways of knowing. Care ethics recognizes the asymmetry of caring relationships and attention to this power imbalance is required. Only the person being cared for can determine what constitutes ethical care.

(p. 22)

In this scoping review, we focus on this normative theory and how ethics of care translates into empirical research on technology-mediated care work. Due to the increasing technology use in healthcare services, our research question reflects ongoing processes to integrate technology-mediated care practices into traditional professional care cultures. The knowledge base on how technological innovations impact ethics of care in established care practices is surprisingly scarce [14]. As a recent scoping review identified, research on care ethics in healthcare practice in general is equally meagre [15]. In an integrative literature review, Korhonen et al. [16] explored how the concept of technology and its ethics are defined in the caring and nursing sciences and in practice. They found that the common question and focus of research has been technology itself—what it is, who uses it and for what purposes. Other research interests have included nurses' technical skills and competences, how technology influences nurse–patient interaction and how technology changes nursing. Across the articles, the authors called for more evidence to promote ethical care when using technology.

We are interested in what ethics of care can contribute as a theoretical framework and how it can serve as a tool for navigating these new landscapes in technology-mediated healthcare. Therefore, the aim of this scoping review is to map how ethics of care informs empirical studies of technology-mediated care with the purpose of identifying knowledge gaps. We have established that our research question has not already been addressed (i.e. through search protocols and systematic review reports in the JBI and Cochrane Libraries and others).

METHODOLOGY

This article presents the results of a systematised scoping review on how ethics of care translates into empirical research on technology-mediated care work [17, 18]. We chose the scoping review because it is useful when mapping research on “terra incognita”. To identify such research, scoping reviews necessarily have broader research questions and inclusion criteria than systematic reviews. Scoping reviews have the potential to identify gaps and can therefore pave the way for more focused research questions that can be gainfully addressed, for example by systematic reviews [19].

The scoping methodology comprises the following steps: (1) identifying the research question, (2) identifying relevant studies, (3) selecting studies, (4) charting the data and (5) separating, summarising and reporting the findings [18].

Identifying the research question

The research question guiding this scoping review was: How does ethics of care inform empirical research on technology-mediated healthcare practices?

Identifying relevant studies

In June 2021, we reviewed original articles resulting from a systematic search strategy of eight databases: CINAHL with full text, Academic Search Premier, MEDLINE, the Philosopher's Index, SocINDEX with Full Text, SCOPUS, APA PsycInfo and Web of Science. Together with a librarian, the research group developed a search string. The search words are presented in [Table 1](#). The scope delimitation followed the mnemonic strategy PCC (population, concept and context). Health professionals were the Population, the Concept of interest was ethics of care, and the Context was technology-mediated healthcare practices. Regarding the population, search words consist of synonyms for health personnel and different types of healthcare professionals. Regarding the concept, ethics of care appears in the literature under different terms. We have included the terms 'feminist ethics' and 'relational ethics'. The term 'nursing ethics' could have been included because of its focus on relationships in care, but due to its co-existing ties to medical ethics [20], we did not include it. We also excluded terms such as 'everyday ethics' of nursing [20] and 'lived ethics' [21], even though they reach beyond a more medical and principle-based approach to ethics in healthcare. To identify empirical research with the concept of ethics of care in the context of technology-mediated healthcare practices, we searched for different types of technologies relevant to healthcare. The search string was established by connecting the search words in each of the PCC categories using the Boolean operator AND.

The following inclusion criteria were created: (1) original research articles written in English and (2) empirical, peer-reviewed research articles. No time limit was defined

because care ethics was established in the early 1980s [4, 5], and we wanted to include also early studies on the subject as well as the most recent research. We manually screened the reference lists of the included papers for additional records.

In June 2022, we repeated the main search together with a librarian. This time, we limited the search to May 2021–May 2022 to capture the most recent studies.

Selecting studies

Our first database search generated 716 articles. We removed 273 duplicates and records marked as ineligible. The remaining 443 articles were screened by abstract and, when necessary, by full text to assess whether articles were empirical. Of these, 301 articles were not empirical.

The full texts of the remaining 142 articles were reviewed to exclude those that did not explicitly use the terms ethics of care, relational ethics or feminist ethics. Many articles implicitly dealt with ethics of care without explicitly using the term. These were excluded to avoid subjective interpretations. Four authors read an equal share of the articles and discussed cases of doubt, resulting in the exclusion of 131 articles. The remaining 11 articles were included, and their reference lists were manually scanned for relevant articles. Four articles were subsequently added to the sample. Our second main search in 2022 resulted in 86 articles. We ended up with three additional articles that met our inclusion criteria. Altogether, our search yielded 18 empirical studies for analysis. [Figure 1](#) provides an overview of our selection process using a modified PRISMA 2020 flow diagram [22].

Charting the data

The next stage involved charting key information from the included articles [18]. We extracted the following data: authors, publication year, journal, country of origin, synonymous terms for ethics of care (i.e., care ethics, relational

TABLE 1 Overview of search words in the PPC strategy.

Population	Concept	Context
"healthcar* personnel" or "healthcar* provid*" or "healthcar* professional*" or nurs* or physician* or "medical doctor*" or "moral agent*" or "car* worker*" or "care professional*" OR "healthcare assist*" OR "healthcare worker*"	"ethic* of car*" or "car* ethic*" or "feminist ethic*" or "female ethic*" or "relational ethic*" or "feminist car* ethic*" "femini* ethic*"	"welfare technology*" OR "healthcare technolog*" OR "care* technolog*" OR "assistive technolog*" OR robot* OR "robot* car*" OR telecar* OR etechnolog* or telemedicine OR mhealth OR ehealth OR telenurs*

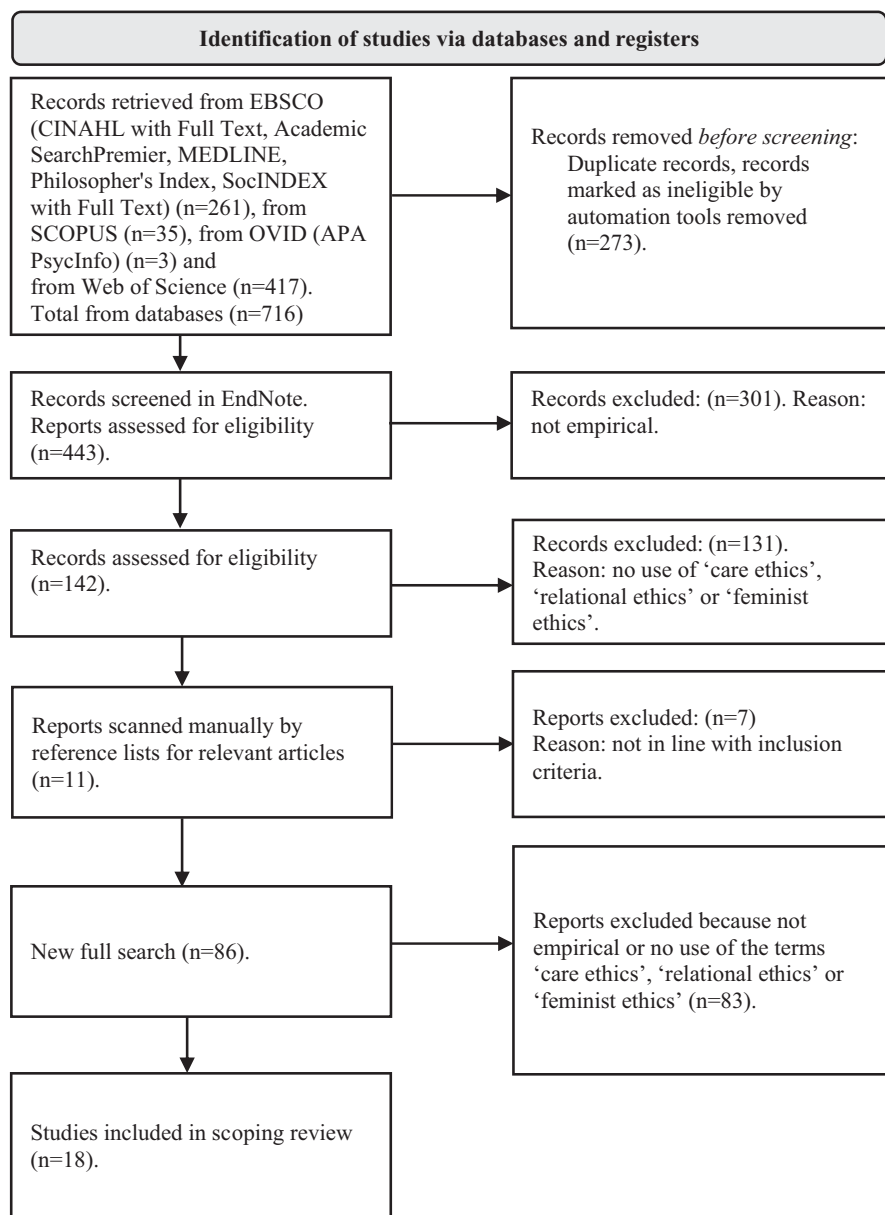


FIGURE 1 Flow diagram of search outcomes and selection process.

care or feminist ethics), type of technology, aim(s) and participants (see Table 2).

To answer our research question of how ethics of care informs empirical research on technology-mediated healthcare practice, we assessed and analysed the articles according to [1] how and when ethics of care was introduced in the articles, [2] the aim(s) of using ethics of care, and [3] how care ethics contributed to the articles' findings.

Separating, summarising and reporting the findings

In this review, we first provide a summary of the study characteristics, followed by an in-depth inquiry of the included studies.

The included articles had a narrow geographical base, with 11 from Scandinavia, four from Canada, two from the US and one from the UK. Although we searched different databases comprising mono- and interdisciplinary journals, most of the articles were published in nursing journals ($n=12$). The included articles were published between 1987 and 2022, and a noticeable increase could be seen in articles from 2000 onwards. This is maybe not surprising with successively more technologies being implemented since the digital revolution starting during the late 20th century.

Although the articles had individual aims and scopes, we identified how 14 of them could be grouped according to one of the following two overarching aims: (1) to identify and/or explore *care ethical dilemmas, challenges or questions* [20,24-27,34] ($n=7$) or (2) to explore and/or uncover and understand *the impact of technology on care and*

TABLE 2 Overview of the 18 empirical studies included in the scoping review.

No.	Author(s) and year	Journal	Country	Terms for care ethics	Type of technology	Aim(s)	Participants
1	Andersson Marchesoni et al. (2017) [23]	<i>Nursing Ethics</i>	Sweden	Feminist care ethics	eHealth	To interpret values related to care and technologies connected to the practice of good care	Nurses and nurse assistants
2	Bunch (2000) [24]	<i>Journal of Advanced Nursing</i>	Norway	Caring ethics	ICU technologies	To generate empirical knowledge of the ethical decision-making process on a high technology unit and how nurses and physicians are involved	Health care personnel (nurses and physicians)
3	Bunch (2001) [25]	<i>Nursing Ethics</i>	Norway	Caring ethics	ICU technologies	To identify ethical dilemmas for ICU nurses and how they are solved/dealt with	ICU nurses
4	Bunch (2002) [26]	<i>Nursing Inquiry</i>	Norway	Caring ethics	ICU technologies	To add empirical knowledge on care ethical dilemmas	ICU nurses
5	Cronqvist et al. (2004) [27]	<i>Nursing Ethics</i>	Sweden	Ethics of care and relational ethics	ICU technologies	To analyse experiences of moral concerns in intensive care nursing	ICU nurses
6	de Ruiter et al. (2016) [28]	<i>Nursing Philosophy</i>	Minnesota, USA	Ethics of care	eHealth	To gain an understanding of how electronic health records impact everyday care delivery and the clinician–patient relationship	Patients, healthcare professionals, system administrators and managers
7	Heinsch et al. (2021) [29]	<i>Ethics & Behaviour</i>	UK	Relational ethics	eHealth	To consider the specific ethical complexities in the provision of a social networking intervention for depression and problematic alcohol use involving providers and peers	Health care personnel and patients
8	Holmström and Högglund (2007) [20]	<i>Journal of Clinical Nursing</i>	Sweden	Relational ethics	eHealth	To describe ethical dilemmas in the form of conflicting values, norms and interests experienced by telenurses	Nurses
9	Ilomäki and Ruusuvaori (2022) [30]	<i>Nursing Ethics</i>	Finland	Care ethics	eHealth	To analyse how video mediation shapes client autonomy when nurses guide medicine taken remotely through video-mediated home care	Home care clients and nurses
10	Laholt et al. (2019) [31]	<i>Nursing Ethics</i>	Norway	Ethics of care	Visual technologies	To explore how school public health nurses identify and resolve the ethical challenges involved in the use of visual technologies in health dialogues with adolescents	School public health nurses

(Continues)

TABLE 2 (Continued)

No.	Author(s) and year	Journal	Country	Terms for care ethics	Type of technology	Aim(s)	Participants
11	Macdonald et al. (2018) [32]	<i>Journal of Medical Internet Research</i>	Canada	Relational ethics	eHealth	To understand how participants perceived and experienced different types of eHealth	Patients and healthcare professionals
12	Nickelsen and Bal (2021) [33]	<i>International Journal of Environmental Research and Public Health</i>	Denmark	Care ethics	eHealth	To answer how an experimental eHealth workshop contributes to overcoming barriers between the social worlds of healthcare	Patients
13	Oberle and Hughes (2001) [34]	<i>Journal of Advanced Nursing</i>	Canada	Relational ethics	ICU technologies	To identify and compare doctors' and nurses' perceptions of ethical problems	Health care personnel (nurses and doctors)
14	Peter et al. (2015) [35]	<i>Nursing Ethics</i>	Canada	Feminist ethics	ICU technologies	To explore nurses' moral competences related to fostering hope in patients and their families and how these competencies are shaped by the social-moral spaces of nurses' work	Nurses
15	Ray (1987) [36]	<i>Dimensions of Critical Care Nursing</i>	Colorado, USA	(Human) caring ethics	ICU technologies	To uncover the meaning of caring for nurses working in critical care	Nurses
16	Salminen-Karlsson and Gølay (2022) [37]	<i>New Technology Work and Employment</i>	Sweden	Ethic of care	eHealth	To explore the different ways that health information systems (HIS) influenced nurses' work	Nurses and assistant nurses
17	Townsend et al. (2015) [38]	<i>Journal of Medical Internet Research</i>	Canada	Relational ethics	eHealth	To understand how patients and health care professionals perceive the influence of eHealth technologies and how it influences the relationship between patients and health care professionals	Patients and health care professionals
18	Turja et al. (2022) [39]	<i>International Journal of Social Robotics</i>	Finland	Care ethics	Care robots	The aim was twofold: to see how Finnish eldercare workers' views towards care robots have changed (first phase) and to investigate factors that would explain variations in the value-based assessment of robot use (second phase)	Nurses and physiotherapists who worked in elder care services

relationships [23, 28, 30, 32, 36–38] ($n=7$). The remaining four articles presented different aims. One explored *moral competence* and hope in caring relations [35], whereas another considered the *specific ethical complexities* in social networking interventions [29]. A third article explored *workshop methodologies* for developing collaborations involving care values [33], while the last surveyed *a change in care workers' views of care robots* due to variations in the value-based assessment of robot use [39].

The articles concerned various user groups, but the majority dealt with professional healthcare workers ($n=12$). One article focused only on patients, while five articles included both professionals and patients. The articles also engaged with different types of technology. We identified two main strands of technologies, which we categorised as (1) intensive care unit (ICU) technologies ($n=7$) and (2) eHealth ($n=9$), broadly defined here as information, communication and monitoring technologies in the health sector, ranging from e-journals to digital information tools [32, p. 2]. Two articles fell outside this categorisation, as they were about care robots [39] and visual technologies [31]. All included articles were reviewed for explicit use of ethics of care. Ten articles used the term ethics of care, but the equivalent terms relational ethics ($n=5$), ethics of care and relational ethics ($n=1$) and feminist ethics ($n=2$) were also deployed. Based on the contribution of ethics of care as a theoretical framework as either insubstantial or substantial, we grouped the articles into two main clusters, accordingly.

Insubstantial use of care ethics

In the first cluster of nine articles, 'ethics of care' was mentioned only briefly [20, 24–28, 33, 34, 36] and did not play an explicit role in informing the study design or empirical material. For Bunch [24–26], ethics of care was positioned as one of several possible ethical approaches and was not integral to the analysis. De Ruiter et al. [28] mentioned 'ethics of care' only in the abstract. Although their focus on the electronic health record's impact on care delivery and the clinician–patient relationship arguably has a care ethical perspective, this was not explicitly stated in the main body of the article.

Nickelsen and Bal [33] included 'ethics of care' in the keywords and used the term in their conclusions. However, throughout the remainder of their text, they applied the term 'in-action ethics'. Holmström and Höglund [20] used the term 'relational ethics' in their introduction, with a general statement that 'nurses are known to focus on relational ethics, particularly emphasizing the care aspect' (p. 1866). Both Ray [36] and Oberle and Hughes [34] used 'ethics of care' (or its equivalent) only once in their

articles, and the latter also deployed the term 'nursing ethics' and referred to 'relational ethics', citing Sorlie et al. Ray [36] used the terms 'human caring ethics', 'principle-based ethics' and 'experiential ethics' and argued that her study 'show[ed] the close relationship between caring and ethics' (p. 170). Cronqvist et al. [27] were concerned with ethical challenges and promoted a care ethical framework of caring for/about that was informed by 'classical' care ethics [4, 5], specifically nursing-oriented literature. Cronqvist et al. [27] argued in favour of developing moral action knowledge—an ethical awareness in real-life situations. This view aligns with an ethics of care understanding, but ethics of care was not referred to in the context of their argument.

Substantial use of care ethics

In the remaining cluster of nine articles, the ethics of care was deployed as an integrated theoretical framework and analytical tool. Moreover, care ethics contributed substantially to the articles' findings. Table 3 provides an overview of how ethics of care informs the articles.

Ethics of care as an integrated theoretical framework and analytical tool

Importantly, several articles made a point of including technologies and non-humans as part of an integrated care ethical framework [29–32, 37, 38]. Laholt et al. [31] placed the care ethical framework developed by Annmarie Mol in the foreground, precisely because Mol 'expands the notion of ethical care to include the action of technologies' (p. 1823). For Heinsch et al. [29], incorporating technologies is a way of widening the net of relationships normally accounted for in relational ethics. Drawing on actor–network theory, they showed how technologies are an integrated (f)actor in present-day care practices, whereas both Townsend [38] and MacDonald et al. [32] demonstrated how technological tools bring out relational and care ethical aspects in everyday practices and situations. Salminen-Karlsson and Golay [37] explored how professional healthcare workers experience tensions between care rationality and technical rationality as ethical dilemmas.

In line with our search criteria, the terms ethics of care, care ethics, relational ethics and feminist ethics were used interchangeably. Some articles renamed or readdressed ethics of care as 'occupational ethics' [39] and 'empirical ethics' [30]. While some suggested that care ethical relations rely on technology-mediated healthcare practices as part of professional and occupational norms and values

TABLE 3 Overview of how ethics of care as a theoretical framework informs the 9 empirical studies in cluster two.

No.	Author	Aim of using care ethics	Contribution of using care ethics
1	Andersson Marcheoni et al. [23]	Tronto's feminist care ethics in terms of four core elements of care: attentiveness, responsibility, competence and responsiveness	Feminist ethics of care enables an analysis of the caregivers' basis for providing good care, namely, the desire for disturbance-free interactions, being valued for their skills and working in a trustful working environment. The caregivers sometimes felt that the technological rationality interfered with their main mission of providing quality care
2	Heinsch et al. [29]	Relational ethics draws attention to the social, political and interpersonal connections that shape moral decision-making. In combination with actor-network theory (ANT), this entails widening the net of relationships normally accounted for in relational ethics to include e-mental health technology itself	Relational ethics combined with ANT revealed ways in which technologies can shape clinicians' responses to disclosures of suicidal ideation in online environments. Applying a relational ethics lens enabled recognition of the burdens and vulnerabilities that professionals can experience and the importance of clinical supervision and peer support as key sources of ethical guidance in this context.
3	Ilomäki and Ruusuvaori [30]	Care ethics is used to theoretically inform on autonomy, claiming that it is enabled by people's interactions. Care ethics is taken further into the concept of 'empirical ethics', which also includes non-human as part of configuring autonomy	Care ethics is developed into empirical ethics to include more technology awareness. Empirical ethics makes it possible to identify intricate local negotiations of autonomy, social interaction and care-relevant artefacts in the physical world
4	Laholt et al. [31]	Authors adopt Mol's ethics of care (2008), which expands the notion of care ethics to include technologies as relevant in the use of visual technologies in health dialogues with adolescents	Ethics of care enables an analysis of ethical uncertainties, not as a weakness, 'but rather as a way of trying new approaches, to experiment and modify one's practice' (p. 1829)
5	Macdonald et al. [32]	Relational ethics is used because it addresses the ethical content and decisions implicit in everyday relationships and conversations	The relational ethics lens makes it possible to see how eHealth technology contributes to the changed relations between healthcare personnel (HCP) and patients and are evolving towards more collaborative care. eHealth technologies have the potential of incorporating relational ethics of person-centred care into practice
6	Peter et al. [35]	Feminist ethics take empirical data into account when developing the ethical concept and is sensitive to power differences	Feminist ethics make possible an articulation of moral competence and have reinforced Walker's (2003) belief that morality is primarily interpersonal and exists in practice
7	Salminen-Karlson and Golay [37]	The concept of care ethics is used to explore problems that nurses confront when interacting with HIS	Care ethics and technical rationality opens new perspectives that connect nurses' everyday frustrations with digital tools to fundamental issues regarding healthcare values today and in the future
8	Townsend et al. [38]	Core elements of relational ethics are applicable to everyday experiences, practice, and interactions. Applying relational ethics helped with focusing on what is valued in interactions and relationships and what is at risk, rather than specific aspects of eHealth, such as the nature of self-monitoring devices	Relational ethics is useful for understanding how technology impacts relational shifts in ethical patient-HCP relationships using health-related internet information systems from a traditional hierarchical relationship to a more reciprocal relationship, where mutual vulnerabilities can be revealed
9	Turja et al. [39]	The perspective of care ethics forms the basis for the hypotheses explaining HCPs' attitudes towards care robots	Care ethics informs how social norms behind robot acceptance originate from more universal, ethical standards of care work (occupational ethics) rather than shared attitudes and social norms in the respondent's workplace

[39], others argued that the 'empirical ethics perspective expands the relationality by including not only other humans but also technologies and other artefacts, material infrastructure, various norms, values and ideals of care and different kind of practices as important parts in configuring autonomy' [30, p. 721].

When used, the term 'feminist ethics' was deliberate. According to Peter et al. [35], it has the capacity 'to inform the development of ethical concepts not just through reason but also through the use of empirical data' (p. 744). Moreover, they argued that feminist ethics is sensitive to power differences, which may enable analytical sensitivity to vulnerability and privilege. For Andersson Marchesoni et al. [23], feminist ethics allows for sensitivity to the everyday-ness of care work: 'Relational and feminist ethicists claim that the majority of dilemmas in healthcare and social care occur during day-to-day activities and are not dramatic situations' (p. 126). Their study [23] identified values in everyday life indirectly from caregivers' expressions. They referred to Tronto's [40] idea that 'care is a central but devalued aspect of human life' (p. 157), which understands care as a political idea affecting the status of those engaged in care work.

Recognition of new relationships between patients and healthcare professionals

Several articles addressed relational shifts between patients and healthcare practitioners [29, 32, 37, 38], for example, 'from a traditional hierarchical relationship to a more reciprocal relationship' [38, p. 7] or relationships characterised by 'collaborative care' [32]. Macdonald et al. [32] claimed that eHealth technologies have accelerated patient-centred care philosophy, facilitating 'a relationship wherein the patient is a person who meaningfully participates in the process of his or her own treatment' (p. 9). However, this new relationship is 'far from complete, and it is unclear whether the role of eHealth will be to facilitate further changes in power dynamics or maintain the hierarchy between patients and HCPs' [health care personnel] (p. 9).

Some mentioned mutual vulnerability as a sign of a changing patient–healthcare personnel relationship due to technology [29, 38]. Townsend et al. [38] suggested that, within valued relationships, healthcare personnel's burdens and vulnerabilities are also recognised. Clinical encounters thus become a 'moral space' where negotiations, vulnerabilities and trust are part of an ongoing process for a 'partnership model' (p. 9).

Salminen-Karlsson and Golay [37] studied the implementation of health information systems in a large university hospital in Sweden and found that it led to standardisation of care. Relationships with patients got less personal and were instead formed by predefined steps. The

authors asserted that 'nurses felt that they were becoming computer people rather than caring people' (p. 283).

Recognition of new ethical challenges with the use of technologies

Six of the articles dealt explicitly with ethical challenges [23, 29, 31, 35, 37, 38]. These challenges are not necessarily new, but they may appear differently in technology-mediated care situations compared to face-to-face encounters [29].

One of the challenges described was that technology affects communication between healthcare personnel and patients in various and, at times, opposing ways. Heinsch et al. [29] found that online communication has limitations, as it implies a loss of non-verbal social clues, meaning that healthcare personnel receive less information about the patient, and the therapy becomes more difficult. In contrast, Laholt et al. [31] found that smartphone videos made it easier for adolescents to share information with public health nurses. However, the nurses found the adolescents' direct, yet distant, communication challenging, as the use of visual technologies could make it difficult to assess the gravity of a situation. Another challenge for the nurses was dealing with the lack of control of sensitive information shared by and among adolescents.

In both studies [29, 31], healthcare personnel processed challenges with technologies in peer collaboration through which they reflected, adjusted and navigated ethical issues. Here, the use of technology highlights the values and rationalities in care work and may support a culture that already involves care ethical issues [23, 35, 37]. According to Peter et al. [35], the use of technology also produces tensions between providing false hope and destroying hope, particularly within a biomedically informed, cure-focused culture. While technology also created false hope, professionals redirected patients' and families' hopes away from technology, for example, by ensuring that patients interacted with personnel before they interacted with technology.

For caregivers, it is important 'to see the person behind the illness and be attentive towards not only the person's medical conditions but also their personal preferences and shifting needs' [23, p. 133]. Salminen-Karlsson and Golay [37] found that technologies hindered nurses from providing such ethical (holistic) care. According to the authors, this happened because technology is based on a technical rationality emphasising medical conditions, which clashes with care practices focusing on patients' needs. This implies a conflict between nurses' values and technical priorities and points to challenges in everyday healthcare practices and values, problematising issues of standardisation and personal responsibility.

Andersson Marchesoni et al. [23] interpreted caregivers' values of good technology-mediated healthcare to be 'presence', 'appreciation', 'competence' and 'trust'. They further advised that '[t]echnology should support these values and not cause stress or shift attention from the care receiver to the technical application' (p. 134). The authors referred to Tronto's understanding of competence and claimed that 'incompetent care is not only a technical problem but also a moral one' [23, p. 134]. The authors claimed that caregivers have a general mistrust of technologies and concluded that 'technologies in relation to values (i.e., how technologies can be a means to support good care and how these technologies can be put into practice) should be placed at the centre of discussions about care among policy makers, managers, staff and the public' (p. 135).

Townsend et al. [38] identified shared relational values for care, such as mutuality, responsibility, honesty and trust among patients and personnel, and claimed that a relational lens reveals how interaction can support or obstruct realisation of such values.

DISCUSSION

Our findings have identified a research gap in empirical studies on technology-mediated healthcare practices. Of 443 initial articles, only a few ($n=18$) explicitly used ethics of care (or its synonyms). How can we understand this lack of explicit use of the term 'ethics of care'?

One observation is that ethics of care as an integrated theoretical framework and analytical tool was mostly applied in studies emerging from the Scandinavian context. This geographical concentration is not surprising, as Nordic countries have a strong drive towards implementing care and welfare technologies [41] as part of the evolving welfare state model. Furthermore, these countries also have a prominent tradition in caring science and the ethics of care, particularly in Scandinavia, with Martinsen [7], Eriksson [12], Delmar [42] and Pettersen [8] as leading theorists and/or educators within healthcare. A common denominator for this tradition of care research is the concern for the fundamental issues in care, such as human dependency, power, vulnerability, dignity and mortality [43], as evidenced in the articles included in this review. This indicates that the combined attention to welfare technologies and caring science/care ethics as part of a welfare state context triggers an interest in using ethics of care as a theoretical framework for research on technology-mediated healthcare.

Our findings suggest that ethics of care, despite its potential for universal relational applications, tends to be adopted as a perspective on professional practice for professionals. Implicit in the dominance of this perspective

may be the notion that ethics of care is a professional ethics and that it should be the healthcare professional's responsibility to ensure ethics of care in the caring relationship with patients and next of kin. A downside to this is that we may forego knowledge about how patients and next of kin engage in and experience care ethical relationships within technology-mediated care practices.

Interestingly, several of the articles that contained in-substantial use of care ethics had a care ethics perspective that was not explicitly expressed. This suggests that, if we had also assessed articles for tacit use of a care ethical perspective, the number of included articles would have been higher.

One interpretation of this lack of explicit use of ethics of care can be that ethics of care is poorly defined and may therefore not be deemed adequate as a universal ethical theory. Another potentially confounding factor is an apparent lack of clarity regarding what distinguishes ethics of care from other ethical frameworks. This is something that we experienced first-hand when identifying search terms for our review. As it was not sufficient to use 'ethics of care', we added the search terms relational ethics and feminist ethics to cover ethics of care as an overall framework. However, during our analysis of the included articles, we found that some described 'relational ethics' through the lens of biomedical ethics. In other words, we found little consistency in the use of ethics of care as a concept, even among articles with substantial use of 'ethics of care'.

Ways to address the core relational foundations of care ethics were visible in some articles that showed the impact of care technologies in everyday care practices and relations [23, 32, 38], while comparisons of conflicting underpinnings for caregiving practices were made visible by others [35, 37]. Interestingly, several authors argued that care ethical theory needs development and expansion to encompass technologies and the non-human aspects of care and suggested reframing care ethics as 'occupational ethics' [39] and 'empirical ethics' [30]. Although we appreciate this turn of attention, such calls for the expansion of care ethical theory [29, 31] risk undercommunicating the ways in which the ethics of care framework already manifests as highly relevant within all kinds of relations, including technology-mediated ones. To illustrate, our findings underscore how technology-mediated care brings both timeless and new relational tensions and dynamics to the foreground. The emphasis on situational, practice-near and day-to-day care in the articles [23, 35] shows how relationality, albeit mediated by care technologies, remains at the core of care practices. As Tronto [40] argued:

[Care is] a species activity that includes everything that we do to maintain, continue, and repair our world so that we can live in it

as well as possible. That world includes our bodies, ourselves, and our environment, all of which we seek to interweave in a complex, life-sustaining web.

(p. 103)

To an extent, this understanding of care is also echoed in the suggestions to reframe care ethics as occupational [39] and empirical [30] ethics, as these concepts emphasise care as work and situational practices. At the same time, reframing or renaming could exacerbate the already inconsistent use of care ethics, thereby potentially weakening the fundamental aspects of relational care necessary for care practices, whether technology-mediated or not. In our review, the relationality of care work is precisely what is in question, along with how technology-mediated care (re)centres relationships between patients and healthcare professionals and ethical questions/dilemmas. Important for further research, as we see it, is to continue cultivating an ethics of care that acknowledges the different relations and practices involved in contemporary healthcare.

Our identification of how technology-mediated healthcare practices create new relationships between patients and healthcare professionals shows how a care ethical framework can highlight hidden power asymmetries. The included articles emphasised the importance of holistic care, in which healthcare personnel see the individual patient and their needs rather than having a standardised or one-size-fits-all approach. Here, ethics of care represents a powerful ethics of the particular. According to Tomkins and Bristow [44, p. 132], it is necessary to renegotiate the historically difficult relationships with the particular, recasting them from something uncomfortable into something that can underpin and enhance professionalism.

Some of our findings suggest that the technologies in use are tools more for management and doctors than for nurses [23, 35, 37]. A shared concern emerging from these studies is that the technological design demonstrates a poor understanding, from both designers and managers, of nurses' work, values and code of ethics. To navigate the different value propositions within this field, normative thinking is required rather than thinking that is centred on achieving maximum efficiency [44, p. 134]. Increased emphasis on ethics of care may offer such a normative framing and, thereby, a better balance between competing values.

Technology-mediated healthcare can be characterised by a 'fix-it' solutions-oriented culture or a 'what works' culture defined by the ways in which evidence-based practices are understood and applied [44]. However, these cultures may impose limits on the 'messier' growing capacity of a caring practice [45] that relates to specific problems and specific people. To illustrate, in two of our included studies, the authors referred to cultures of 'technical

rationality' [23, 37] that hinder nurses from providing holistic care. Ethics of care has the potential to confront such cultures by emphasising and recognising the fundamental value of professional relational expertise, practical reasoning and critical inquiry in relational and technology-mediated care practices [44]. Further, Tomkins and Bristow [44] claimed that, from a care ethical perspective, 'a singular focus on "what works" risks becoming a strategy of carelessness' (p. 138), the consequences of which may jeopardise future care.

Ethics of care demands thinking in terms of relations and interpersonal dynamics, and the use of new technologies in healthcare seems to bring about new dimensions of such relational care. A key finding in our material was that, when ethics of care is used as a theoretical framework, this appears to make the vulnerabilities of healthcare practitioners visible. When healthcare providers become aware of their own vulnerability, they become sensitive to other beings in their charge and are thereby better equipped to understand their world and act ethically [46]. Such awareness is fundamental for the practice and experience of quality care.

Limitations

We acknowledge that our search strategy may have omitted research relevant to our research question. Explicitly using the term 'ethics of care' (or adjacent terms) might have led to omitting articles that involved care ethics but where the term was not highlighted or signposted. Moreover, our findings show that ethics of care was mostly applied in research on technology-mediated care in the Scandinavian context. Authors of this review are Scandinavian, and inclusion of articles published in Scandinavian languages may have increased the total number of included articles in this review.

CONCLUSION

This review has mapped how ethics of care informs empirical studies on technology-mediated healthcare. We identified a research gap, in that there was a scarcity of articles that explicitly and substantially applied this framework. Our review highlights how ongoing discussions about technology-mediated care could benefit from a consistent ethics of care framework, particularly in terms of acknowledging the emergence of new relations and vulnerabilities between patients and healthcare professionals, and new ethical dilemmas associated with the use of technologies. Thus, the scarcity of empirical research deploying a care ethical perspective indicates that more

knowledge is needed to address how care ethics can reach its full potential in contemporary technology-mediated care practices. For ethics of care to be used more explicitly and coherently in empirical studies, it may also be important that ethics of care is recognised by the scholarly community as an adequate, universal ethical theory. Our suggestion is to continue cultivating ethics of care to include all kinds of relations in the meetings between patients, healthcare professionals and technologies, as well as with the institutional care regimes and networks of family and community.

AUTHOR CONTRIBUTIONS

All authors made significant contributions to this review. All authors discussed the purpose and design of the review. The first author, together with a librarian, conducted literature searches and screened articles in close collaboration with all authors. The first author led the writing process, but all authors contributed to the data analysis, discussion and drafting of the manuscript and approved the final version.

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None of the authors have any conflicts of interest related to the content of this paper.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

ETHICS STATEMENT

This type of study in Norway does not require ethical approval.

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