Tampere University

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Healthcare and Social Welfare Professionals' Perceptions of User Involvement in the Implementation of Digital Services and Its Impact on Well-being

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ACADEMIC DISSERTATION
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TO MY DAUGHTERS ♥

"Believe in yourself"

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Munkkiniemessä toukokuussa 2025, Janna Nadav

ABSTRACT

The aim of this dissertation was to deepen understanding of healthcare and social welfare professionals' experiences with digital service implementation, focusing on user involvement and its relationship to professional well-being. Particular attention was given to differences between professional groups, physicians, registered nurses, and social welfare professionals. The study was guided by the concept of cognitive participation from the Normalization Process Theory and the Job Demands–Resources model.

A two-phased multi-methods design was employed. Phase I consisted of eight focus group interviews (n = 30) conducted in four Finnish health centers to explore factors supporting digital service implementation from the perspective of user involvement. Phase II utilized three national cross-sectional survey datasets (n = 9,240) to examine associations between user involvement, collaboration with software vendors, and professionals' well-being.

The results revealed that meaningful opportunities to participate in information system development and responsive feedback mechanisms fostered a sense of ownership and engagement among professionals. However, user involvement without adequate organizational support, particularly during early implementation phases, was associated with increased stress and workload. Physicians reported lower levels of system-related stress compared to other groups, especially when collaboration with software vendors was perceived as effective. Overall, vendor responsiveness emerged as a key protective factor for professionals' well-being.

The findings underscore the need for comprehensive, well-resourced, and professional-specific implementation strategies. Tailoring user involvement to the realities of different professional groups, ensuring time and organizational support for participation, and maintaining transparent feedback loops are essential not only for successful digital service implementation but also for sustaining professionals' motivation, engagement, and well-being.

Keywords: digitalization, implementation, user involvement, professional well-being, healthcare and social welfare professionals

TIIVISTELMÄ

Tämän väitöskirjan tavoitteena oli syventää ymmärrystä sosiaali- ja terveydenhuollon ammattilaisten kokemuksista digitaalisten palvelujen käyttöönotossa, erityisesti käyttäjien osallistumisen ja ammattilaisten hyvinvoinnin välisestä yhteydestä. Erityishuomio kiinnitettiin eri ammattiryhmien välisiin eroihin. Näitä ammattiryhmiä olivat lääkärit, sairaanhoitajat ja sosiaalialan ammattilaiset. Tutkimusta ohjasivat Normalisointiprosessiteorian käsite ”sitoutunut osallistuminen” (Cognitive participation) sekä Työn vaatimukset - voimavarat -malli (JD-R).

Tutkimus toteutettiin kaksivaiheisella monimenetelmällisellä tutkimusasetelmalla. Ensimmäisessä vaiheessa tehtiin kahdeksan fokusryhmähaastattelua (n = 30) neljässä suomalaisessa terveyskeskuksessa, joissa tarkasteltiin digitaalisten palveluiden käyttöönottoa käyttäjien osallistumisen näkökulmasta. Toisessa vaiheessa hyödynnettiin kolmea valtakunnallista poikkileikkausaineistoa (n = 9 240), joiden avulla tarkasteltiin tilastollisia yhteyksiä käyttäjien osallistumisen, ohjelmistotoimittajayhteistyön ja ammattilaisten hyvinvoinnin välillä.

Tulokset osoittivat, että osallistumismahdollisuudet, jotka tarjosivat todellista vaikutusvaltaa ja näkyvyyttä kehittämisprosessissa, vahvistivat ammattilaisten omistajuuden ja sitoutumisen tunnetta. Sen sijaan käyttäjien osallistaminen ilman riittävää organisaation tukea erityisesti käyttöönoton alkuvaiheessa oli yhteydessä lisääntyneeseen stressiin ja kuormitukseen. Lääkärit raportoivat muita ammattiryhmiä matalampia tietojärjestelemästressin tasoja, erityisesti silloin, kun yhteistyö ohjelmistotoimittajien kanssa koettiin toimivaksi. Tyytyväisyys ohjelmistotoimittajien kehitystyöhön näyttäytyi keskeisenä ammattilaisten hyvinvointia suojaavana tekijänä.

Tulokset korostavat kattavien, resursoitujen ja ammattiryhmäkohtaisesti räätälöityjen käyttöönottostrategioiden merkitystä. Käyttäjien osallistaminen tulee sovittaa eri ammattiryhmien todellisiin työolosuhteisiin, varmistaa riittävä aika ja tuki osallistumiselle sekä ylläpitää läpinäkyviä palautekäytäntöjä. Nämä tekijät ovat keskeisiä sekä onnistuneen käyttöönoton että ammattilaisten motivaation, sitoutumisen ja hyvinvoinnin kannalta.

Avainsanat: Digitalisaatio, käyttöönotto, käyttäjien osallistuminen, ammatillinen hyvinvointi, sosiaali- ja terveydenhuollon ammattilaiset

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ABBREVIATIONS

IS	Information system
HIS	Health information system
CIS	Client information system
EHR	Electronic health record
COVID-19	Coronavirus disease 2019
OR	Odds ratio
TENK	Finnish National Board on Research Integrity
WHO	World Health Organization
RN	Registered nurse
SWP	Social welfare professional
SPSS	IBM Statistical Package for Social Sciences
RStudio	Integrated Development Environment (IDE) for R
ANCOVA	Analysis of covariance
SD	Standard deviation
THL	Finnish Institute for Health and Welfare
SRIS	Stress related to information systems
AI	Artificial intelligence
EU	European Union
EHDS	European Health Data Space
SOTE reform	The Finnish health and social services reform
NPT	Normalization Process Theory
JD-R	Job-Demands-Resources model
CFIR	Framework for Implementation Research
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance Model
FITT	Fit between Individual, Task, and Technology
STS	Socio-Technical Systems Theory
DCS	Demand-Control-Support model

ORIGINAL PUBLICATIONS

This study is based on the following publications, which are referred to throughout the text by their Roman numerals:

I Nadav J, Kaihlanen AM, Kujala S, Laukka E, Hilama P, Koivisto J, Keskimäki I, Heponiemi T. How to Implement Digital Services in a Way That They Integrate Into Routine Work: Qualitative Interview Study Among Health and Social Care Professionals. J Med Internet Res. 2021 Dec 1;23(12):e31668. doi: 10.2196/31668.

II Nadav, J, Kaihlanen, AM, Salovaara, S, Saukkonen, P, Virtanen, L, Kujala, S, Keskimäki, I, Heponiemi, T. The association of client information system implementation with the well-being of Finnish social welfare professionals: a cross-sectional study. Nordic Social Work Research. 2024; 1–14. doi: 10.1080/2156857X.2024.2437636

III Nadav J, Kaihlanen AM, Kujala S, Keskimäki I, Viitanen J, Salovaara S, Saukkonen P, Vänskä J, Vehko T, Heponiemi T. Factors Contributing to Successful Information System Implementation and Employee Well-Being in Health Care and Social Welfare Professionals: Comparative Cross-Sectional Study. JMIR Med Inform. 2024 Nov 21;12:e52817. doi: 10.2196/52817.

The language of this study summary has been improved with the help of artificial intelligence (AI). It was used only to clarify and refine the language in accordance with the ethical guidelines of Tampere University, which permit the use of AI-based language models for language editing. Furthermore, all the edited content has been reviewed and approved by the author. AI was not used for any of the original studies (Studies I-III).

1 INTRODUCTION

The digitalization of healthcare and social welfare has significantly progressed in recent years as a result of technological innovations, policy developments, and increased pressure to improve cost-effectiveness, accessibility, and continuity of care (WHO, 2021). The World Health Organization's Global Strategy on Digital Health 2020–2025 (2021) highlights that digital technologies are important for achieving universal health coverage, improving population health, and preparing for health crises. Strategic and innovative use of different digital services such as electronic health records (EHRs), remote tools, artificial intelligence (AI), and data exchange platforms is seen as important to increase access, improve outcomes, and improve recognition (Udegbe et al., 2024; Enahoro et al., 2023; Singh et al., 2022).

At the European level, digital services are supported through major policy initiatives and funding methods (European Commission, 2025a). The European Commission's EU4Health program and the Digital Europe Program aim to improve digital infrastructure, cross-border health data exchange, and digital skills among healthcare and social welfare professionals (European Commission, 2025c). Additionally, the European Health Data Space (EHDS) is being developed to promote the secure use and sharing of health data across its member states (European Commission, 2025b). These efforts are supported by the WHO's goals and highlight human-centric, ethical, and evidence-based digital services in healthcare and social welfare settings (European Commission, 2025b; WHO, 2021). In Finland, the Ministry of Social Affairs and Health (2024) has outlined a national strategy that places digitalization at the heart of the healthcare and social services reform, with the goal of easing professionals' workloads through the implementation of advanced digital services.

In Finland, the health, social welfare, and rescue services have undergone major structural reforms as part of a larger system transformation, which included the integration of these services into a single system through the SOTE reform (the Finnish health and social services reform) and the establishment of Wellbeing Services Counties (Keskimäki et al., 2019; Tynkkynen et al., 2023). Additionally, great importance has been placed on accelerating digital change to improve service integration, efficiency, and

accessibility (Ministry of Social Affairs and Health, 2024; Tynkkynen et al., 2023). The national strategies have also highlighted digitalization as a key enabler of service integration, accessibility, efficiency, and the well-being of both clients and professionals (Ministry of Social Affairs and Health, 2024). However, the rapid pace of system changes, combined with the implementation of new digital services, has also placed significant demands on professionals' workflows and coping capabilities. These professionals are at the core of service delivery and play an important role in implementing digital services (Kaihlanen et al., 2023; Martikainen et al., 2025). Moreover, professionals working in the healthcare and social welfare sector comprise large and varied groups including physicians, registered nurses (RNs), social welfare professionals (SWPs), and other allied professionals, making them one of the largest occupational groups in Finland (Tevameri, 2021; Tynkkynen et al., 2023).

One of the most widely identified enablers of successful digital service implementation is professionals' involvement in the development of the digital service (Brown et al., 2020; Cresswell & Sheikh, 2013; Martikainen et al., 2020; Ross et al., 2016). User involvement refers to the active participation of professionals in the design, implementation, evaluation, and continuous development of digital services (Kujala, 2008). When professionals' involvement is meaningful, digital services are more likely to meet practical needs, enhance engagement, and reduce resistance to change among professionals (Martikainen et al., 2020; Vaisson et al., 2021). However, in practice, involvement is often limited to symbolic participation or limited to specific professional groups, mainly physicians, while RNs and SWPs frequently report exclusion from development processes (Frennert, 2023; Gillingham, 2021; Martikainen et al., 2025, 2025; Stanczyk et al., 2017).

This study examines the implementation of digital services in Finnish health and social welfare settings from the perspective of professionals, focusing particularly on the largest professional groups (physicians, RNs, and SWPs) using digital services. Digital service implementation refers to the design, implementation, and ongoing development of digital services (Eboreime et al., 2019). The term 'digital services' was chosen as the main concept to refer to the various digital services implemented in healthcare and social welfare settings, including electronic health records (EHRs), health and client information systems (HISs and CISs), e-prescriptions, digital counseling platforms, telehealth services, and decision support systems (Härkönen et al., 2024). The term was chosen because it accurately captures the combination of technology, professional

practice, and service delivery, particularly when addressing user involvement and how it impacts professionals' well-being.

Furthermore, this study specifically focuses on information systems (ISs) as part of digital services when examining professionals' well-being. In this study, ISs are used as an umbrella term referring to the core information system services employed in healthcare and social welfare settings, such as electronic health record (EHR) systems in healthcare and client information systems (CISs) in social welfare. This focus was chosen based on previous research indicating that ISs are among the most extensively used digital services in the everyday work of healthcare and social welfare professionals (e.g., Cresswell & Sheikh, 2013; Gillingham, 2015). These systems have been closely associated with cognitive workload, time pressure, and perceived job control, which are all key factors which can endanger professionals' well-being (Demerouti et al., 2001; Heponiemi et al., 2021; Kaihlanen et al., 2020). Well-being is identified as a multidimensional concept that includes psychological, physical, and occupational dimensions, with a specific focus on cognitive demands, stress, and job satisfaction (Bautista et al., 2023). However, in this study, professionals' well-being is examined through previously validated stress-related measures, including stress related to information systems (SRIS; Hyppönen et al., 2019), psychological distress (Goldberg et al., 1997), and general stress symptoms (Elo et al., 2003), which have been widely used in prior healthcare and social welfare research (e.g., Heponiemi et al., 2021; Kaihlanen et al., 2021; Vainiomäki et al., 2020).

The aim of this study is to develop a deeper understanding of: (1) how health and social welfare professionals experience digital service implementation from the perspective of user involvement, (2) how this involvement affects their well-being, and (3) how these experiences and impacts differ across professional groups. As digital services become increasingly embedded in service delivery, it is critical to understand how these services influence everyday work and professional well-being.

2 REVIEW OF THE LITERATURE

This literature review chapter consists of four parts. The first part describes how the literature search was conducted, the second part consists of an exploration of the main concepts underlying the study, the third part entails a discussion of the theoretical approaches relevant to the research, and the final part concludes the chapter with a summary including identified research gaps.

2.1 Literature search

A literature search was conducted to develop the theoretical framework and to identify the key concepts concerning user involvement in digital service implementation and its impact on professionals' well-being. The search was performed on three electronic databases, CINAHL, Scopus and MEDLINE (Ovid), from the 25th to the 30th of December 2024. To ensure the relevance and quality of the results, the search was designed in collaboration with a university information specialist. The literature search was divided into two complementary sub-searches. The first focused on the concepts of implementation, digitalization, user involvement, and healthcare and social welfare professionals. The second focused on implementation, digitalization, user involvement, well-being, and healthcare and social welfare professionals. This division was made because a single search combining all concepts returned a very limited number of results, suggesting that research combining all elements is still relatively limited. To ensure a more comprehensive understanding of the phenomenon, it was therefore necessary to separate the searches.

The search strategies involved Medical Subject Headings (MeSHs) and relevant keywords. Boolean operators (AND, OR) were used along with truncation and proximity operators to optimize the retrieval of relevant studies. The included studies had to meet all the following criteria: peer-reviewed journal articles; conducted in healthcare or social welfare settings; focused on digital service implementation, user involvement, or professionals' well-being; published in English; and published between 2014 and 2024. We excluded non-peer-reviewed publications (e.g., editorials, opinion

papers, conceptual essays), studies unrelated to digital services, and those focusing solely on patients or clients without professional-level data. The main search terms (together with synonyms) used across the databases were:

- Digitalization
- Implementation
- Well-being
- User involvement
- Healthcare and social welfare professionals

To ensure comprehensive coverage, the literature search was supplemented by screening the reference lists of selected articles, manually searching digital journals in the fields of healthcare and social welfare (e.g., *Journal of the American Informatics Association, Journal of Medical Internet Research, International Journal of Medical Informatics, Informatics for Health and Social Care, and Research in Nursing and Journal of Social Work*), and conducting additional searches using Google Scholar. After removing 35 duplicates, 629 articles were maintained for title/abstract screening. 145 articles were assessed at full text. Each full text was assessed in detail, and a final selection of 83 articles was made, as they directly addressed the research questions of this study and met all the criteria. The included studies were read in full and thematically coded according to whether the identified factors acted as enablers or barriers of implementation and whether they related to user involvement or professionals' well-being. This categorization enabled a structured narrative synthesis and a clear conceptual foundation for the theoretical framework.

Most reviewed studies focused on large-scale digital service implementations, such as electronic health records (EHRs). Only a few studies addressed digital consultations, telehealth, and remote services. In terms of professional groups, RNs and physicians were the most frequently studied, while only a few studies focused on SWPs. Moreover, many of the included studies were conducted in the United States.

2.2 Digital service implementation and user involvement

This section begins by synthesizing the previous literature on digital service implementation from the perspective of healthcare and social welfare professionals. More specifically, it outlines the key enabling and barrier factors identified by healthcare and social welfare professionals regarding implementation of digital services. Following this, a separate section focuses more deeply on user involvement, which is of particular interest in this study.

2.2.1 Implementation of digital services

Digital service implementation refers to a process whereby new technologies are introduced, implemented, and adopted within healthcare and social welfare settings (Greenhalgh et al., 2017; Ross et al., 2016). In these settings, digital services may involve electronic HISs, and CISs, various mobile devices, and other electronic solutions intended to support care delivery and professional work (Ball et al., 2024; Jedwab et al., 2023; Nguyen et al., 2024; Provenzano et al., 2024). Importantly, digital service implementation is not only a technical activity, but also a socio-technical process that redesigns professionals' workflows, professional roles, and organizational culture (Cresswell et al., 2017; Gagnon et al., 2016). Healthcare and social welfare professionals' experiences are shaped by a combination of *enablers and barriers* that influence their engagement, adaptation, and well-being during implementation (Nguyen et al., 2021).

In this review, the identification and grouping of enablers and barriers followed an interpretive approach. Factors were extracted from each study based on how they were described to either support or hinder the implementation process, as reported by authors or participants. A factor was classified as an enabler when it promoted engagement, adoption, or sustained use, and as a barrier when it hindered or complicated these processes. The same factor could appear in both categories depending on contextual and organizational conditions. For instance, "training" acted as an enabler when described as adequate, relevant, and timely, but as a barrier when insufficient, delayed, or poorly targeted. Similarly, "leadership," "communication," and "usability" could function as either facilitators or barriers depending on their quality, presence, and alignment with professional needs. The following sections summarize the main enablers and barriers identified in the reviewed literature.

Enablers of digital service implementation

Comprehensive and context-specific training

Comprehensive and tailored training is one of the most frequently identified enablers of successful digital service implementation. Training programs integrating real-world simulations, profession-specific content, and peer-led learning have been shown to enhance professionals' confidence, digital competence, and readiness to adopt new technologies (Bagot et al., 2020; Bîlbîie et al., 2024; Brown et al., 2020; Ervin et al., 2021; Gagnon et al., 2016; Or et al., 2018; Zakaria & Mohd Yusof, 2016). Furthermore, tailored and interactive approaches help professionals adapt to new workflows and sustain engagement (Burgess & Honey, 2022; Chang et al., 2016; Ross et al., 2022)

Specific professional needs also shape effective training strategies, reflecting the diverse digital competencies required in healthcare and social welfare. For example, RNs benefit most from hands-on programs that reflect clinical routines and patient care workflows (Wynter et al., 2022; Bimerew, 2024), as these approaches strengthen practical confidence and facilitate the integration of digital services into everyday care delivery. Physicians, in contrast, require training that supports diagnostic reasoning and decision-making in digital contexts (Kalayou et al., 2021; Leeuw et al., 2020; Nguyen et al., 2024), aligning with their need to interpret complex data and apply clinical judgment within electronic systems. SWPs, in turn, value training that addresses documentation practices, data protection, and ethical considerations (Njane et al., 2021; Ross et al., 2022; Sadang et al., 2023), which are central to their professional accountability and client trust. Moreover, collaborative and peer-supported training formats have been shown to enhance engagement and foster long-term knowledge retention across all professional groups (Gaucher et al., 2024; Gui et al., 2020; Lombardi et al., 2023; Ojo & Adegbile, 2021).

Ongoing technical and peer support

Continuous technical and peer support is another critical enabler of digital implementation success. Accessible and multifaceted support systems, such as on-site super users, help desks, quick-reference guides, and peer mentoring, promote confidence, reduce stress, and encourage sustained system use (Hudson, 2023; Kernebeck et al., 2021; Leeuw et al., 2020; Lombardi et al., 2023; Or et al., 2018; Osajiuba et al., 2021; Yuan et al., 2015). Super users and digital champions play a particularly

valuable role, as their contextual understanding and peer-based support make assistance more approachable and timely, especially in the fast-paced environments of healthcare and social welfare settings (Cresswell et al., 2017; Leeuw et al., 2020). Acting as both technical guides and motivational change agents, digital champions help reduce uncertainty and resistance during implementation (Gavin et al., 2024; Martikainen et al., 2020; O'Donnell et al., 2018). Their contribution fosters a culture of continuous learning, shared ownership, and openness to digital innovation (Burgess & Honey, 2022; Osajiuba et al., 2021). Peer-led initiatives have also been associated with stronger digital trust, improved usability experiences, and more resilient adoption outcomes (Siebeck & Hoving, 2024; Surani et al., 2019).

Usability and ease of use

Usability and ease of use are consistently identified as critical factors in the successful implementation of digital services. Intuitive and logically structured systems that align with professional workflows enhance user satisfaction, efficiency, and long-term engagement (Gagnon et al., 2016; Or et al., 2018; Wynn et al., 2023). High usability also reduces cognitive load and supports productivity, particularly in time-pressured environments (Abdekhoda et al., 2015; Bitaraf et al., 2022; Gavin et al., 2024). Role-specific dashboards, integrated documentation tools, and streamlined navigation are among the most frequently recommended design features (Kernebeck et al., 2022; Petitgand et al., 2020). It has been suggested that usability should be regarded as a strategic priority, as it directly influences both the quality of care and professionals' well-being (Asiri, 2024; Bagot et al., 2020; Tan et al., 2024).

Leadership and organizational support

Previous research demonstrates that strong leadership and supportive organizational structures are key determinants of successful digital service implementation. Leaders who visibly champion digital transformation foster trust, motivation, and engagement among professionals (Burgess & Honey, 2022; Gagnon et al., 2016; Petitgand et al., 2020). Moreover, transparent communication within the organization ensures that goals, expectations, and the rationale for change are clearly understood across professional groups (Laukka et al., 2020; Leeuw et al., 2020; Zhou et al., 2019). Equally important is that leaders facilitate inclusive feedback processes and invest in supportive infrastructure such as adequate training opportunities, protected time for system use, and responsive technical support (Dowding et al., 2015; Osajiuba et al., 2021; Sadang et al., 2023). These

practices strengthen professionals' digital readiness and confidence while promoting shared ownership of implementation outcomes (Laukka et al., 2020; Wynn et al., 2023).

Barriers to digital service implementation

Increased documentation, workload, and time constraints

One of the most frequently reported barriers to digital service implementation is the growing burden of documentation and workload. Rather than reducing administrative tasks, information systems such as EHRs and CISs often increase workload through repetitive data entry, rigid templates, and the dual use of paper and digital records (Bagot et al., 2020; Brown et al., 2020; Ross et al., 2022). These issues are particularly acute in resource-constrained environments that lack workflow integration and managerial support (Dowding et al., 2015; Dutta et al., 2020; Wynter et al., 2022).

According to previous research, professionals' experiences may differ across professional groups. RNs report that these demands cause cognitive overload and reduce time for direct patient care (Chang et al., 2016). SWPs highlight that structured documentation formats fail to capture the narrative and relational aspects of their client interactions (Lombardi et al., 2023b; Ross et al., 2016), while physicians note that documentation detracts from clinical focus and patient engagement (Raglan et al., 2017). High workloads, staff shortages, and the absence of protected time for training or system use further limit adoption (Wynter et al., 2022; Cresswell & Sheikh, 2013). These problems are especially visible during transition periods when both paper and digital systems must be maintained, leading to duplicated work and frustration (Wynter et al., 2021).

Although some studies suggest that well-designed systems and proper training can enhance efficiency (Bitaraf et al., 2022; El Mahalli, 2015; Gagnon et al., 2016; Yoo et al., 2022), the literature consistently indicates that documentation overload, time pressure, and inadequate support remain key barriers particularly when implementations are rushed or poorly aligned with professional workflows (Bimerew, 2024; Cirkel et al., 2024; Gavin et al., 2024).

Usability and system complexity issues

In contrast to the enabling role of intuitive design, poor usability and system complexity remain extensive barriers to successful digital service implementation. Non-intuitive interfaces, excessive navigation steps, and repetitive data entry increase frustration and the likelihood of errors (Kernebeck et al., 2021; Raglan et al., 2017; Yoo et al., 2022). These challenges are particularly significant in high-pressure environments, where unreliable or complex systems can undermine professionals' confidence and compromise the quality of care (Cresswell et al., 2017; Ray et al., 2017; Zakaria & Mohd Yusof, 2016).

Previous studies indicate that such usability issues are experienced across professional groups, though their indications vary depending on workflow structures and information needs. Commonly reported problems include fragmented processes, difficulties in accessing or updating information, and systems that prioritize administrative functions over professional judgment and client interaction (Wynter et al., 2022; Gillingham, 2021; Zakaria & Yusof, 2016).

Insufficient training and support

Conversely, when comprehensive and context-specific training, identified earlier as a key enabler, is lacking, it becomes a major barrier to adoption and implementation. Generic or prematurely delivered training sessions often leave professionals unprepared to manage complex systems (Hudson, 2023; Nguyen et al., 2024). Moreover, according to the previous literature, when post-implementation support is insufficient, frustration and disengagement often follow, leading to inefficient workarounds and decreased trust in digital systems (Gui et al., 2020; Njane et al., 2021). This is also problematic in demanding environments where technical failures disrupt service continuity (Bimerew, 2024; Dowding et al., 2015; Sadang et al., 2023). Sustained technical and peer support should therefore be considered integral to implementation and maintenance rather than optional additions (Burgess & Honey, 2022; Ojo & Adegbile, 2021; Yoo et al., 2022).

Organizational and Hierarchical Barriers

Finally, hierarchical decision-making structures and limited inclusion of frontline professionals can hinder implementation. RNs and SWPs often report being excluded from strategic or design-level discussions, leading to diminished ownership and

engagement (Martikainen et al., 2020; Nilsson et al., 2016). Physicians likewise express frustration when their feedback is disregarded during system updates (Gui et al., 2020). Such exclusion reinforces perceptions that professional expertise is undervalued, weakening trust in digital transformation processes (De Corte et al., 2019).

2.2.2 Professionals' involvement in digital service implementation

The active involvement of professionals increases the likelihood of successful digital service implementation. Active involvement enhances the association between digital systems and everyday workflows, increases usability, and promotes professional ownership of technologies (Barfoed, 2019; Khanchel-Lakhoua & Kadri, 2024; Martikainen et al., 2021). In the literature, the concept of user involvement appears alongside related terms such as user participation, end-user engagement, co-design, co-creation, and user-centered design (Kujala, 2003; Sánchez De La Guía et al., 2017). While these terms emphasize slightly different aspects of involvement, they all aim to permit users to shape the services that impact their work. User involvement refers specifically to the active participation of professionals in the design, testing, implementation, and modification of digital services (Vaisson et al., 2021). It differs, for example, from co-design, which implies equal and continuous collaboration between users and developers throughout the process (Antonini, 2021), and from participatory design, which emphasizes the democratic right of users to influence technologies shaping their work (Sanoff, 2022).

According to previous studies, participation levels may vary across professional groups. For example, physicians, particularly those in leadership positions, are often more involved in customization and advisory roles due to their institutional influence (Martikainen et al., 2025). Conversely, RNs and SWPS often experience limited opportunities to contribute, and refer to a lack of representation and limited access to decision-making structures (Abbott et al., 2015; Gui et al., 2020; Martikainen et al., 2025). Previous studies shows that meaningful involvement improves system significance, ownership, and perceived usability (Bagot et al., 2020; Gagnon et al., 2016; Wynn et al., 2023). Professionals who participate in co-design and piloting phases report stronger alignment between technologies and practical needs (Kernebeck et al., 2021; Reeder et al., 2014). It has also been shown to reduce workarounds and enhance engagement (Stanczyk et al., 2017).

However, despite its benefits, user involvement continues to face barriers in healthcare and social welfare settings. These include time constraints, digital literacy challenges, hierarchical organizational structures, and uncertainty about the actual impact of feedback (Martikainen et al., 2020; Nilsson et al., 2016). When professionals perceive that their input is not valued or acted upon, motivation to participate declines (Stanczyk et al., 2017). Studies also suggest that systems designed without adequate professional input may prioritize administrative control over holistic care, leading to moral distress among practitioners (De Corte et al., 2019; Gillingham, 2021).

2.3 User involvement and professionals' well-being in the context of digital service implementation

This section first discusses several factors that negatively influence healthcare and social welfare professionals' well-being during digital service implementation. It then synthesizes prior literature to examine how user involvement impacts well-being across different professional groups, including physicians, RNs, and SWPs. The aim is to deepen understanding of the relationship between user involvement and well-being and to explore potential differences between professional groups in these dynamics.

Well-being is defined as a multidimensional construct encompassing an individual's physical, psychological, social, and environmental state (Kiefer, 2008). In the context of health and social care professionals, well-being includes factors such as job satisfaction, perceived stress, burnout, professional autonomy, and a sense of meaning at work (Ball et al., 2024; Heponiemi et al., 2017). During digital service implementation, well-being is particularly influenced by how systems support or hinder professionals' daily workflows, how professionals perceive system usability, and the extent to which they feel empowered and competent in their use of these technologies (Jedwab et al., 2022; Shaharul et al., 2023).

2.3.1 Key factors in digital service implementation affecting professional well-being

The implementation of digital services in healthcare and social welfare settings has been shown to significantly impact professionals' well-being, with experiences varying across physicians, RNs, and SWPs (Asgari et al., 2024; Bail et al., 2023; Ball et al., 2024; Elliott et al., 2022; Eschenroeder et al., 2021; Frennert, 2023; Golz et al., 2024; Heponiemi et al., 2019, 2021; Hilty et al., 2023; Holmgren et al., 2024; Jedwab et al., 2023; Shaharul et al., 2023; Tajirian et al., 2020, 2022; Wekenborg et al., 2024). Commonly reported stressors in the literature include poor usability and system reliability, time pressure, increased documentation workload, inadequate training, insufficient IT and peer support, and weak integration of digital tools into daily workflows.

While these challenges are shared across professions, their intensity and nature vary. Physicians experience stress due to after-hours documentation, alert fatigue, and diminished influence over clinical workflows, which undermines their sense of professional autonomy and satisfaction (Holmgren et al., 2024; Peccoralo et al., 2021; Wekenborg et al., 2024). The pressure to manage increasing clerical workloads and technological complexity can also reduce opportunities for patient interaction, which many physicians perceive as a loss of meaningful engagement in care (Provenzano et al., 2024; Tajirian et al., 2022). RNs, in turn, often face continuous changes to digital tools with limited time for adaptation, leading to heightened time pressure and cognitive load, particularly during the early phases of implementation (Golz et al., 2024; Heponiemi et al., 2021). Moreover, many RNs report insufficient training and support, which are linked to technostress, documentation errors, and reduced well-being (Kaihlanen et al., 2020; Wu et al., 2024). SWPs' experiences highlight additional ethical and relational dimensions: they report significant stress related to technical problems, lack of support, and the perception that digital systems undermine client relationships, especially in social assistance work (Nordesjö & Scaramuzzino, 2023). Furthermore, many feel excluded from decision-making around digital solutions, leading to moral distress when system requirements conflict with client-centered values (Frennert, 2023).

Despite these challenges, several protective factors such as comprehensive training, responsive IT support, strong leadership, and active user involvement in system design and implementation have been shown to mitigate negative effects and promote professional well-being (Bernburg et al., 2024; Esmaeilzadeh & Mirzaei, 2021; Heponiemi et al., 2018). Furthermore, professional collaboration and peer support

networks play a vital role in easing transitions and fostering resilience during digital change (Jedwab et al., 2023; Li et al., 2022). Building on these findings, the following section explores how varying levels and forms of user involvement influence professionals' well-being during digital service implementation.

2.3.2 Impact of user involvement on professional well-being

Meaningful user involvement is widely recognized as a critical enabler of both successful digital service implementation and improved professional well-being across healthcare and social welfare settings (Reeder et al., 2014; Bagot et al., 2020; Shaharul et al., 2023). As mentioned in the previous chapter, active participation by professionals in the planning, design, testing, and implementation phases promotes a sense of control, increases ownership, and enhances the perceived relevance and usability of the systems (Kernebeck et al., 2021; Heponiemi et al., 2021; Kaihlanen et al., 2021).

However, experiences with user involvement vary notably across professional groups. Physicians often report frustration due to a lack of responsiveness from vendors and limited influence over system design, leading to dissatisfaction and stress when systems fail to align with clinical workflows (Nguyen et al., 2021; Elliott et al., 2022; Heponiemi et al., 2017, 2018; Asgari et al., 2024). RNs frequently highlight the lack of involvement in implementation decisions and experience elevated stress when digital systems increase administrative burden without supporting patient care (Jedwab et al., 2021; Provenzano et al., 2024; Vehko et al., 2019). For SWPs, insufficient engagement in system development often results in tools that do not reflect the collaborative, client-centered nature of their work, exacerbating ethical tensions and professional dissatisfaction (Frennert, 2023; Gillingham, 2021; Nordesjö & Scaramuzzino, 2023).

While co-design and pilot participation have been shown to improve system–workflow alignment and usability (Reeder et al., 2014; Kernebeck et al., 2021; Larson, 2021), superficial or symbolic involvement where feedback is collected but not acted upon can foster frustration, disengagement, and a sense of disempowerment (Frennert, 2023; Stanczyk et al., 2017; Gillingham, 2021). RNs report higher levels of stress and cognitive failures when excluded from system development, especially during early implementation phases (Heponiemi et al., 2021). Similarly, physicians with limited influence over EHR development often feel burdened by poorly designed systems that increase documentation time and reduce opportunities for direct patient care (Ball et al.,

2024; Nguyen et al., 2021). SWPs, whose practices emphasize individualized and relational care, express concern when standardized digital systems fail to support the diverse needs of their clients (Nordesjö & Scaramuzzino, 2023; Gillingham, 2021).

Importantly, user involvement itself may become a source of stress if not adequately supported. Participation in development activities requires time, cognitive resources, and organizational commitment. Without these, involvement can feel performative or even burdensome, especially for frontline workers already facing high workloads (Holmgren et al., 2024; Reeder et al., 2014; Heponiemi et al., 2019). Physicians have noted that while they may be formally involved in development projects, this often leads to increased time pressure without producing meaningful changes (Heponiemi et al., 2019). To be effective, user involvement must be structured, continuous, and accompanied by feedback loops that ensure professionals' input translates into actionable system improvements (Carayon & Salwei, 2021; Jedwab et al., 2021; Cuesta et al., 2020).

Moreover, across professions, a consistent message emerges systems designed and implemented without meaningful user participation risk undermining professional autonomy, increasing stress, and reducing satisfaction. Involving RNs, physicians, and SWPs as key stakeholders throughout the development lifecycle is therefore essential not only for usability and adoption, but also for protecting the well-being of professionals who rely on these systems in everyday practice (Heponiemi et al., 2021; Li et al., 2022).

2.4 Implementation and well-being theories

This section focuses on common implementation and well-being theories used in healthcare and social welfare settings. It begins by reviewing the most frequently applied frameworks in previous research, followed by a justification for the selection of the theoretical approaches applied in this dissertation.

2.4.1 Theoretical approaches to digital service implementation and professional well-being

From the wide range of available implementation theories, those offering the greatest conceptual and practical relevance for digital service implementation in health and social welfare settings were selected for closer examination in this review. The selected frameworks were either among the most frequently applied in the literature or offered strong conceptual and practical relevance for understanding both the social and technical dimensions of implementation. In line with the pragmatist orientation of this dissertation, the focus was on frameworks that not only explain how change occurs but also indicate how implementation processes and professional well-being can be improved in practice (Nilsen, 2015).

Commonly used frameworks in healthcare and social welfare setting include the Normalization Process Theory (NPT), which explains how new practices become embedded into everyday work of professionals (May et al., 2009), and the Consolidated Framework for Implementation Research (CFIR), which identifies contextual determinants influencing implementation success (Damschroder et al., 2009). In digital contexts, the Technology Acceptance Model (TAM) (Davis, 1989) and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) have been applied to understand user acceptance, while the Fit between Individual, Task, and Technology (FITT) framework (Ammenwerth et al., 2006) and Socio-Technical Systems Theory (STS) (Bostrom & Heinen, 1977) emphasize alignment between technology, tasks, and human factors. Together, these frameworks address the multiple dimensions of digital transformation, where NPT and CFIR focus on social and contextual mechanisms of normalization, while TAM, UTAUT, FITT, and STS illuminate user acceptance and socio-technical alignment. However, they often overlook how implementation processes interact with professionals' motivation, workload, and well-being, factors that determine whether digital change is sustainable in practice.

To capture this dimension, well-being frameworks were also reviewed. The Job Demands–Resources (JD-R) model (Demerouti et al., 2001; Bakker & Demerouti, 2017) explains how the balance between job demands (e.g., workload, cognitive strain) and resources (e.g., autonomy, support, feedback) shapes engagement and burnout. Related approaches such as the Technostress Model (Tarafdar et al., 2007) and the Demand–Control–Support (DCS) model (Karasek, 1979) further highlight the psychosocial mechanisms that affect stress and satisfaction in technology-driven environments.

The frameworks reviewed above are both conceptually robust and practically useful, as they help identify the conditions that can be influenced, for example through leadership, training, or support to protect professionals' well-being during digital transformation. Against this background, the following section explains how one specific concept of NPT, cognitive participation, was combined with the JD-R model to form the analytical foundation of this dissertation.

2.4.2 Combining cognitive participation and the Job Demands-Resources model

The NPT and the JD-R model were selected as the analytical foundation for this dissertation. Together, they provide a focused and complementary perspective for examining digital service implementation and professional well-being. The NPT is structured around four key constructs: coherence (making sense of the service), cognitive participation (engagement and commitment), collective action (practical implementation), and reflexive monitoring (ongoing appraisal and adaptation) (Murray et al., 2010).

However, this study utilizes only the construct *cognitive participation* in this study, as it is closely supported with the central theme of user involvement. According to Murray et al. (2010) cognitive participation refers to the relational work how to engage and participate professionals in the service. When cognitive participation is sufficiently supported the theory suggests that digital service is more likely to become normalized in everyday professional work (Murray et al., 2010). It includes four components:

1. **Initiation:** This phase involves engaging key participants, such as digital champions, to lead the implementation process and foster broader engagement.
2. **Enrolment**: This phase requires organizing participants and encouraging collective contributions to the new practice. Effective enrolment involves building a shared sense of purpose and rethinking existing relationships to support collaboration. For example, securing buy-in from frontline professionals may involve addressing concerns and demonstrating the practical benefits of the digital tool.
3. **Legitimation:** Legitimation ensures that participants feel their involvement is appropriate and valuable. When professionals believe their contributions

are respected and meaningful, they are more likely to remain engaged. Conversely, a lack of recognition can lead to disengagement and uncertainty (Murray et al., 2010).

4. **Activation:** Activation involves defining and sustaining the actions necessary for long-term adoption and successful integration. This includes reinforcing procedures, maintaining communication, and ensuring that digital practice remains visible and relevant in daily work.

To examine well-being, the study integrates cognitive participation with the JD-R model (Demerouti et al., 2001). The JD-R model conceptualizes every job as comprising two key elements: Job demands (e.g., workload, time pressure, cognitive effort), and job resources (e.g., autonomy, peer support, training, recognition)(Bakker et al., 2014). The model suggests that high demands without sufficient resources contribute to a health impairment process such as increased stress, emotional exhaustion, and burnout (Bakker & Demerouti, 2017). Conversely, sufficient resources activate a motivational process that enhances engagement, job satisfaction, and resilience (Nguyen et al., 2014). In digital service implementation contexts, job demands often increase due to unfamiliar workflows, new technologies, and added documentation (Kroth et al., 2019; Vehko et al., 2019). However, job resources such as leadership support, peer networks, and participation in design can buffer these demands and promote well-being (Bagot et al., 2020; Gillingham, 2021; Laukka et al., 2020; Nguyen et al., 2021; Reeder et al., 2014) Particularly, meaningful user involvement itself can function as a job resource when supported appropriately (Hudson, 2023; Nguyen et al., 2024).

This combination of these two frameworks responds to a gap in literature, where implementation and well-being are often examined separately, despite their strong interdependence. By combining a process-oriented construct (cognitive participation) with a determinant-based model (JD-R), this study examines both the relational work that supports user involvement and the psychosocial conditions that influence how it is experienced. The selection also aligns with a pragmatist approach, as both frameworks offer actionable insights into how engagement and well-being can be enhanced in practice. Alternative frameworks were reviewed but found less suitable for this purpose. CFIR identifies contextual factors but not the relational mechanisms sustaining change. TAM and UTAUT explain individual acceptance rather than collective engagement, while Technostress and DCS emphasize strain without addressing the motivational or

participatory dimensions. In contrast, combining cognitive participation with JD-R connects the social dynamics of involvement with the psychological mechanisms that determine whether implementation contributes to or undermines well-being.

Moreover, this theoretical combination provides both analytical and practical value as it captures how meaningful engagement develops and how it can be supported under different organizational conditions. In doing so, it bridges two critical dimensions of digital service implementation, collective engagement in implementation and individual well-being at work, offering a coherent, pragmatically grounded framework for understanding and improving digital changes in healthcare and social welfare. Figure 1 demonstrates the integration of the four components of cognitive participation with the JD-R model.

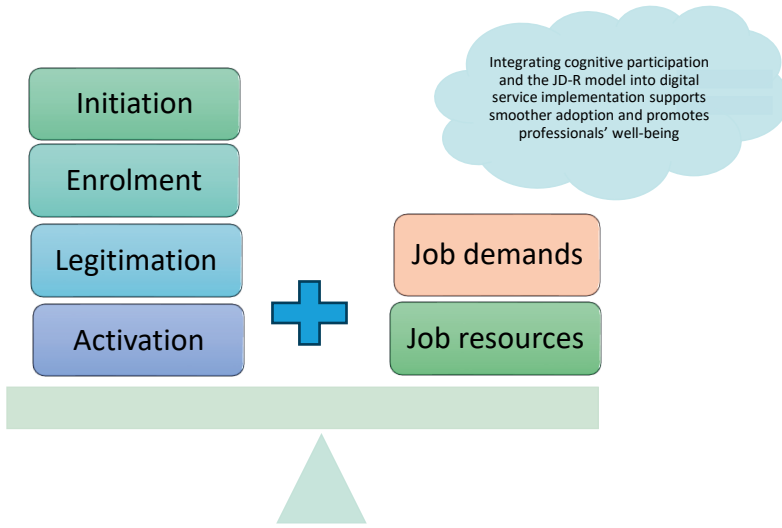

Figure 1. Integrated theoretical framework combining cognitive participation and the JD-R model.

2.5 Identified research gaps

Despite a growing body of literature on digital service implementation in healthcare and social welfare, several important gaps remain. First, while numerous studies have identified general enablers and barriers to the implementation of digital services (Greenhalgh et al., 2017; Cresswell et al., 2017; Gagnon et al., 2016), there is a lack of systematic comparison across professional groups such as physicians, RNs, and SWPs (Jedwab et al., 2021; Heponiemi et al., 2021; Nordesjö & Scaramuzzino, 2023). Moreover, these groups have played central roles in the recent SOTE reform in Finland, providing a unique context for examining their experiences with digital service implementation.

Second, although user involvement is widely recognized as a key success factor (Bagot et al., 2020; Reeder et al., 2014; Heponiemi et al., 2021), limited research has examined the quality, structure, and perceived influence of such involvement, or how these aspects affect professional well-being (Frennert, 2023; Gillingham, 2021; Stanczyk et al., 2017). Third, user involvement itself may become a source of stress when it is insufficiently supported or perceived by professionals as merely symbolic (Holmgren et al., 2024; Reeder et al., 2014; Heponiemi et al., 2019). This phenomenon requires deeper investigation to understand its implications for engagement and well-being.

Fourth, although the role of technical and peer support in safeguarding professionals' well-being has been acknowledged in previous studies (Osajiuba et al., 2021; Burgess & Honey, 2022; Gavin et al., 2024), their differential effectiveness across professional roles and implementation phases remains poorly understood (Leeuw et al., 2020; Martikainen et al., 2020). Finally, the structural and cultural barriers that systematically limit the involvement of certain professional groups, particularly RNs and SWPs require further exploration (Abbott et al., 2015; Gui et al., 2020; Martikainen et al., 2025).

Together, these gaps underscore the need for research that not only investigates the relationship between user involvement and professional well-being but also examines differences between professional groups and implementation contexts.

3 AIM OF THE STUDY AND RESEARCH QUESTIONS

The aim of this study is to deepen understanding of healthcare and social welfare professionals' experiences with the implementation of digital services from the perspective of user involvement. In addition, the study explores how user involvement is associated with professionals' well-being, and whether these experiences vary between professional groups (physicians, RNs, and SWPs). This focus enables the identification of critical factors that support both successful user involvement in digital service implementation and the well-being of different professional users in this context.

The subject is addressed through the following research questions:

- RQ1: What are the experiences of healthcare and social welfare professionals regarding the implementation of digital services from the perspective of user involvement? (Publication I)
- RQ2: How are the implementation of digital services and user involvement associated with the well-being of healthcare and social welfare professionals? (Publications II & III)
- RQ3: Are there differences among healthcare and social welfare professionals in terms of their experiences related to the implementation of digital services and user involvement in relation to their well-being? (Publication III)

4 MATERIAL AND METHODS

This chapter provides an overview of the materials and methods used to examine the research questions. Additionally, this chapter includes a justification of the philosophical foundation of this study and details of the participants and research settings, data sources, and analysis methods used in the individual studies (Table 1).

Table 1. Description of the study process.

Phase	Purpose	Participants	Data collection	Data analysis
Phase I: Qualitative descriptive study (Study I)	To examine health and social welfare professionals' experiences of digital service implementations from the perspective of user involvement	Healthcare and social welfare professionals (n=30) from four different health centers in Finland	Semi-structured focus-group interviews in 2020	Inductive-deductive content analysis
Phase II: Quantitative cross-sectional studies (Study II, III)	To examine the associations and interactions between the phases of client information system implementation, participation in client information system design work, satisfaction with system vendors' responses to feedback, and stress related to information systems and psychological distress	Finnish social welfare professionals (n=990)	A cross-sectional online survey in 2020	Analysis of covariance
	To examine whether professional groups and the factors that contribute to successful implementation (participation in information systems development and satisfaction with software providers' development work) are associated with the well-being of healthcare and social welfare professionals	Finnish healthcare and social welfare professionals (n=9,240)	Obtained from three national cross-sectional online surveys in 2020–2021	Linear and logistic regression analysis

4.1 Research approach

This study was grounded in a pragmatist research philosophy, which emphasizes practical problem-solving, methodological flexibility, and the use of multiple approaches to address complex phenomena (Biesta, 2010; Morgan, 2007). Pragmatism rejects strict boundaries between qualitative and quantitative paradigms, focusing instead on selecting the most appropriate methods to answer the research questions (Morgan, 2007; Feilzer, 2010). In line with this orientation, the dissertation adopted a multi-method design, in which qualitative and quantitative methods were applied in parallel to examine different yet complementary aspects of the overall research problem (McKendrick, 1999). A multi-method approach was chosen rather than a classical mixed-methods design, as each method contributed to separate analytical phases rather than integrating data within a single phase.

Study I employed focus group interviews to generate in-depth, contextual insights into healthcare and social welfare professionals' experiences of digital service implementation. The original article examined digital service implementation more broadly, but in this dissertation only findings related to user involvement are included. Studies II–III, in turn, utilized survey data to identify broader patterns and statistical associations between user involvement and indicators of professional well-being, such as stress-related factors. Together, these studies provided a comprehensive understanding of the phenomenon across different levels of analysis while maintaining methodological coherence within each sub-study.

4.2 Study design, sample, and context

The study was organized over two phases: 1) a descriptive study and 2) cross-sectional studies. The phases are presented below in terms of their study design, samples, and contexts.

4.2.1 Phase I: Descriptive study (Study I)

In the first phase, a qualitative descriptive study design was used, entailing focus group interviews to collect information directly from healthcare and social welfare professionals who were experiencing the phenomenon under investigation (Parker & Tritter, 2006). This design was chosen to gather detailed data on the experiences of these professionals regarding the implementation of digital services. Semi-structured focus group interviews were used to explore both hindering and facilitating factors and to identify factors necessary for successful implementation and integration into routine work. Semi-structured focus group interviews provided a flexible framework for professionals to share their experiences (Clifford et al., 2016). The interviews were conducted at four different health centers located in various parts of Finland. These health centers were selected due to their adoption of innovative digital services before and during the COVID-19 pandemic. In this study, digital services included CISs and HISs, laboratory and imaging systems, decision support systems, and remote consultations.

In Finland, healthcare services are divided into primary healthcare and specialized medical care. During data collection (before the SOTE reform), health centers operated by municipalities served as the first point of contact for citizens in the public healthcare system (Ministry of Social Affairs and Health, 2024). These centers provide a wide range of primary healthcare services, such as general practice outpatient care, maternity and child health clinics, health promotion, oral healthcare, medical rehabilitation, home nursing, laboratory and basic imaging services, and community hospital care. Some health centers also offer specialized services like mental health and substance abuse treatment (Keskimäki et al., 2019). The participants in this study were 30 healthcare and social welfare professionals working at the selected health centers. They were purposively selected by clinic managers who recruited volunteers based on their involvement in client work and recent experience with digital services implementations.

4.2.2 Phase II: Cross-sectional studies (Studies II & III)

The second phase consisted of quantitative cross-sectional survey studies (Studies II and III) to examine the impacts of user involvement on professionals' well-being in healthcare and social welfare settings. The surveys targeted RNs, public health nurses, and midwives (all with at least bachelor-level education and under the age of 65), SWPs

(including social workers and social counselors with at least bachelor-level education and under 65), and physicians (licensed and doing clinical work, under the age of 65). Contact information for professionals was obtained from Finnish trade unions and professional associations representing a significant proportion of the respective populations.

- **Physicians:** 19,142 contacts obtained from the Finnish Medical Association (90.51% of all working-age physicians).
- **RNs:** 29,283 contacts provided by the Finnish Nurses Association, Tehy (the Union of Health and Social Care Professionals in Finland), and TAJA (the National Professional Association for the Interests of Experts and Managers in Health Care) (47.23% of all working-age RNs).
- **SWPs:** 12,471 contacts obtained from Talentia (the Union of Professional Social Workers), JHL (the Trade Union for the Public and Welfare Sectors), and YKA (Social Science Professionals) (40.23% of all working-age SWPs).

The final sample included 9,240 professionals: 4,640 physicians (24% response rate), 3,610 RNs (12% response rate), and 990 SWPs (~8% response rate). The SWPs' response rate could not be calculated precisely due to the additional distribution of survey links via social media (Salovaara et al., 2022).

In Finland, there are a large number of HISs and CISs which are used for extensive purposes, with nearly universal access in public healthcare and social welfare services (Vehko, 2022). However, while Finland has achieved widespread implementation of HISs and CISs across its healthcare and social welfare sectors, the diversity of these systems and the need for improved interoperability remain significant challenges. Ongoing efforts to standardize systems and ensure compliance with national requirements are crucial to enhance the effectiveness of digital services and support healthcare and social welfare professionals in their work (Ministry of Social Affairs and Health, 2024).

4.3 Data collection and instruments

4.3.1 Phase I: Descriptive study (Study I)

The data was collected through eight semi-structured focus group interviews. This method is commonly used in qualitative research to obtain detailed information from a specifically chosen group of individuals, such as the multi-professional teams in this study (Kitzinger, 1995). Two interviews were conducted within each participating organization. Each focus group comprised 4-6 professionals from various professional groups, including physicians, RNs, SWPs and counselors (Table 2). At first, five of the interviews were conducted in person; however, due to the worsening COVID-19 pandemic in Finland, the remaining interviews were conducted remotely via Microsoft Teams. The interviews were conducted by three researchers, all of whom had prior experience in conducting qualitative interviews and in the implementation of digital services.

The interview guide (presented in the original Study I) was developed based on previous literature and was refined in collaboration with the research team. It was tested in a pilot interview using Microsoft Teams, which confirmed that no adjustments were necessary. Therefore, with the consent of the professionals, the pilot interview was included in the study. All interviews were recorded with the participants' permission and subsequently transcribed by a professional transcription service. The transcriptions produced 168 pages of text, formatted with 1.15 line spacing, 11-point font size, and the Verdana font. The interviews lasted between 41 and 79 minutes each, totaling 501 minutes of recorded material.

Table 2. Demographic characteristics of interviewed professionals (N=30) (original table from Study I).

Category and variables		n (%)
User group		
	Registered nurses	8 (27)
	Public health nurses	5 (17)
	Practical nurses	7 (23)
	Physicians	4 (13)
	Social workers	2 (7)
	Social counselor	1 (3)
	Digital counselor	1 (3)
Gender		
	Male	3 (10)
	Female	27 (90)
Age (years)		
	<30	5 (17)
	31-40	11 (37)
	41-50	10 (33)
	51-60	4 (14)
Career in this organization (years)[a]		
	<1	1 (3)
	1-5	15 (50)
	5-10	3 (10)
	10-20	5 (17)
	≥20	3 (10)
Career in total (years)[a]		
	<1	1 (3)
	1-5	7 (23)
	5-10	6 (20)
	10-20	6 (20)
	≥20	5 (17)

[a]Not all the participants answered this question

4.3.2 Phase II: Cross-sectional studies (Studies II & III)

In the cross-sectional studies (Studies II & III), data was collected using national online survey questionnaires between January and March 2021. Invitations to participate in the survey were sent via email to members registered with the above-mentioned trade unions and professional associations. Reminder emails were sent to physicians and RNs (Saranto et al., 2020; Vehko, 2022). Additionally, in the case of the SWPs, the survey link was shared through social media to increase the response rate when it appeared that participation might be low (Martikainen et al., 2021). The questionnaire surveys (*Monitoring of the information system services in social welfare and healthcare*- THL, 2024) consisted of multiple questions related to Implementation of the Monitoring of Information System Services in Social Welfare and Healthcare. The instruments used in cross-sectional studies (Study II, III) are described in the following chapters.

4.3.2.1 Overview of the instruments used

The following sections describe the instruments used in this study to explore user involvement, well-being, the implementation phase, and potential confounders.

User involvement

User involvement was assessed using two different survey items measuring professionals' participation in HIS/CIS development and their satisfaction with software providers' development work related to their feedback. These items best described user involvement, and they were included in the surveys of each professional group.

Participation in HIS/CIS development was assessed by asking whether the professionals participated in HIS/CIS development work. They had three options to choose from: 1) 'yes, some of my working time has been allocated to such development work,' 2) 'yes, in addition to my work,' and 3) 'no.' These options were the same in both studies (II & III).

Satisfaction with software providers' development work was assessed using three statements from the validated National Usability-Focused HIS Scale (NuHISS) (Hyppönen et al., 2019). Professionals were asked to assess three statements based on their experience: 1) 'The software provider is interested in end users' feedback about the system', 2) 'The

software provider implements corrections and change requests according to the suggestions of the end-users', and 3) 'Improvements and change requests are implemented within an acceptable time frame'. The answer options in the physicians' and SWPs' questionnaires ranged from 1= 'fully agree' to 5= 'fully disagree.' However, in the RNs' questionnaire the options ranged from 1= 'fully agree' to 5= 'disagree' together with an additional option 6= 'I cannot say,' which was coded as a missing value. These items were reverse coded to guarantee more logical data analysis and further combined into a mean sum variable (Cronbach's α=0.84 in Study II and 0.89 in Study III). A higher score indicates greater satisfaction.

Well-being

This study utilized three stress-related indicators, self-rated stress, psychological distress, and stress related to information systems (SRIS), to broadly assess the well-being of healthcare and social welfare professionals during digital service implementation.

Self-rated stress was measured with a validated single-item measure which stated that 'Stress refers to a situation in which an individual feels tense, restless, nervous, or anxious, or finds it hard to sleep because of continuously worrying about things,' and asked whether the professional was feeling this kind of stress nowadays (Elo et al., 2003). This variable was rated on a five-point scale ranging from 1= 'not at all' to 5= 'very much.' For the analyses, responses were coded into two categories (0= no stress and 1= stressed), with the original response options 1–2 classified as 'no stress' and options 3–5 as 'stressed'.

Psychological distress was measured with four items (α=0.85) from the widely used General Health Questionnaire-12 (GHQ-12) (Goldberg et al., 1997). These four items represent the anxiety/depression factor from Graetz's three-factor structure, which has been suggested to be the most preferable factor model for GHQ-12 (Graetz, 1991). Professionals were asked to describe their well-being over the past week. They were asked 1) whether they have had difficulty sleeping because of worries, 2) whether they have felt unhappy and depressed, 3) whether they have felt constantly overworked, and 4) whether they have felt that they are not coping with the difficulties they are facing. The response options were 1= 'never', 2= 'not more than usual', 3= 'somewhat or more than usual', and 4= 'much more than usual'. The mean was calculated, and a higher score indicated higher distress. Several different scoring methods for the CHG-12 have been

used, and we decided to use a Likert-type scoring method (1-2-3-4) so that we would have a continuous variable and our results would be comparable to several other studies that have used this method with other health and social care professions in the Finnish context (e.g., Aalto et al., 2018; Heponiemi et al., 2014; Penninkilampi-Kerola et al., 2006). The use of a continuous variable enabled us to get more variation because we were interested in general psychological distress levels (not pathology) in the basically healthy working-age population.

Stress related to information systems was assessed with two items asking the professionals how often 1) changing information systems or 2) awkward or poorly functioning systems have disturbed, worried, or burdened them with extra work during the past six months (Hyppönen et al., 2019). The items were rated on a five-point Likert scale and the options ranged from 1= 'very rarely or never' to 5= 'very often or constantly' in the SWPs questionnaire. However, in the physicians' questionnaire, the options were in reverse order and were therefore reverse-coded. In the RNs' questionnaire the items were rated on a six-point Likert scale, the options ranging from 1= 'never' to 6= 'constantly'. The two items were combined into a mean sum variable (Cronbach's α=0.63 in Study II and α=0.74 in Study III). Furthermore, in Study III, the mean scores were standardized using Z-scores to ensure comparability across groups, as the response scales in the registered nurses' questionnaire differed from those used in the physicians' and social welfare professionals' questionnaires (further details are provided in the Statistical Analyses section). Higher mean scores indicated higher SRIS.

Implementation phase

The instrument included a question on the CIS implementation phase, asking whether the professionals' work unit had implemented or was going to implement a new CIS. They had four options to choose from: 1) 'yes, within the past 6 months', 2) 'yes, within the past 12 months', 3) 'no, but one is forthcoming within the next 12 months' and 4) 'no past or forthcoming implementations within 12 months'. This measure has been used previously, for example in a study by Heponiemi et al. (2021) where its association with SRIS, time pressure, and cognitive failures was examined among Finnish RNs.

Potential confounders

Several potential confounders were identified and addressed due to their impact on professionals' well-being according to previous research (e.g., Babbott et al., 2014; Blomberg et al., 2015; Gómez-García et al., 2021; Heponiemi et al., 2021; Jedwab et al., 2021; Vehko et al., 2019). These confounders included professionals' gender, age, working environment/sector, and time pressure. By accounting for these variables, the study aimed to isolate the effects of digital service implementation on professionals' well-being, ensuring that the observed outcomes are not unduly affected by these confounding factors (Anderson-Cook, 2005).

4.4 Analysis methods

4.4.1 Phase I: Descriptive study (Study I)

In the qualitative study, content analysis was performed using an inductive–deductive approach (Elo & Kyngäs, 2008). At first, the first author thoroughly read through all the recorded interviews multiple times to gain an initial understanding of the data. Then, expressions relevant to the research questions were extracted from the transcripts and coded (n = 224) using ATLAS.ti software (ATLAS.ti Scientific Software Development GmbH). These codes represented condensed versions of the professionals' thoughts. Similar codes were then grouped into sub-categories, which were further organized into upper categories. At this stage, two other researchers reviewed the coding and the formation of sub-categories and upper categories, engaging in discussions to reach a consensus on their content and names. Following this, the deductive method was applied, with the upper categories mapped to the four different constructs of the NPT framework. An example of the development of the content analysis process for the cognitive participation construct is given in Figure 2.

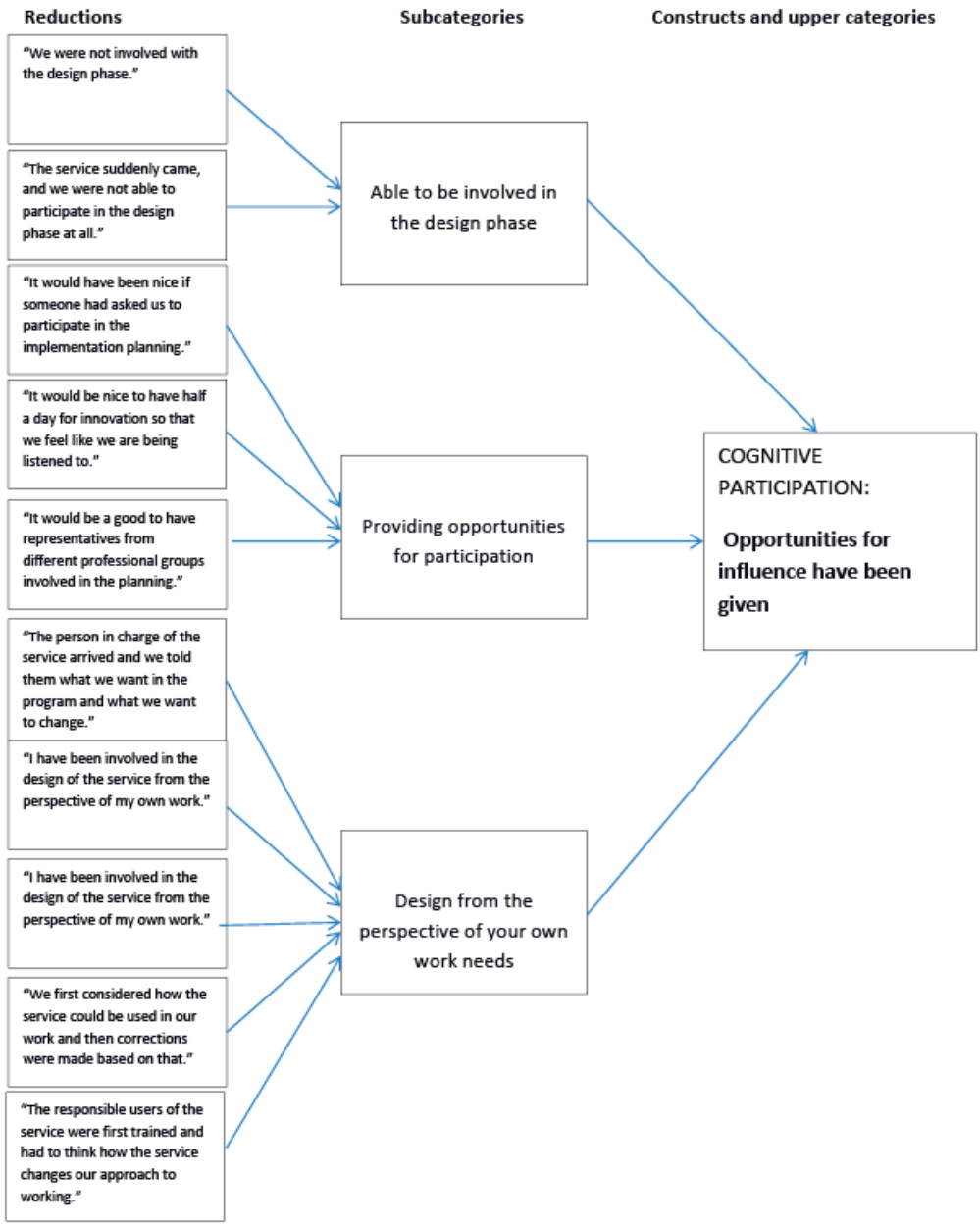

Figure 2. An example of the development of the content analysis process. (Original figure from Study I)

4.4.2 Phase II: Cross-sectional studies (Studies II & III)

In Study II, statistical analysis was utilized to summarize the data. The relationships between the implementation phase, participation in CIS development, satisfaction with vendors' development work, and the dependent variables SRIS and psychological distress were examined using analysis of covariance (ANCOVA). This analysis method was chosen because it allows for the control of covariates, providing a clearer understanding of the main effects. Before conducting the actual analysis, the assumptions of ANCOVA, such as normality of dependent variables, homogeneity of variance, and homogeneity of regression slopes, were tested and met. The analyses were adjusted for age, gender, working environment, and time pressure. Additionally, potential interactions between the implementation phase and a) participation in CIS development and b) satisfaction with vendors' development work were examined for their effects on SRIS and psychological distress. Continuous variables were centered to minimize multicollinearity, as recommended by Nick and Campbell (2007). This means that the mean value was subtracted from each individual score, allowing the interaction effects to be interpreted more clearly and reducing potential issues caused by high correlations between predictor variables (Garofalo et al., 2022). To visually illustrate significant interactions, the continuous variable 'satisfaction with vendors' response to feedback' was categorized using the median split. These analyses were performed using SPSS 27.

In Study III, statistical analysis was also employed to summarize the data. The study investigated the associations between professional groups, participation in HIS/CIS development, satisfaction with software providers' development work (independent variables), and self-rated stress (binary dependent variable) using logistic regression analyses. Linear regression analyses were performed to examine the associations between these independent variables and SRIS (continuous dependent variable). Before the analysis, the assumptions of linearity, homoscedasticity, multicollinearity, and normality of residuals were tested and confirmed. The response scales in the RNs' questionnaire differed from those in the physicians' and SWPs' questionnaires, so SRIS means were standardized using Z-scores to allow for comparisons across merged data sets. Missing data was imputed using the multiple imputation method in R statistical software, incorporating all study variables in the imputation models, and generating five imputed datasets. Main effects were analyzed in two stages: first, univariate effects were examined, and then the fully adjusted model included professional group, participation in HIS/CIS development, satisfaction with software providers' development work, and the

covariates age, gender, and working sector. Additionally, potential interactions between professional group and 1) participation in HIS/CIS development and 2) satisfaction with software providers' development work were examined to ascertain their effects on self-rated stress and SRIS, adjusting for age, gender, and working sector. These analyses were conducted using RStudio (version 4.1.1; R Core Team 2020).

5 RESULTS

This section presents the findings from the three studies, offering a comprehensive understanding of healthcare and social welfare professionals' experiences with digital service implementation from the perspective of user involvement (Study I) and how digital service implementation and user involvement impacts on physicians', RNs', and SWPs' well-being (Study II, III). Each summary outlines the aim, methods, key findings, and contributions of the individual study to this study summary.

5.1 Experiences of healthcare and social welfare professionals with the implementation of digital services from the perspective of user involvement

The aim of this qualitative descriptive study was to explore healthcare and social welfare professionals' experiences of digital service implementation from the perspective of user involvement. The original article examined digital service implementation more broadly, but in this dissertation only the findings related to user involvement are included, as they align with the overall focus of the thesis. Other results from the study are reported in the original publication (Study I).

Professionals emphasized the importance of creating opportunities for influence during the design and implementation phases. Champions, or professionals with specific interest and expertise in the digital service, were identified as critical contributors to successful implementation. However, professionals emphasized that user involvement should extend beyond selected "champions," allowing all professionals to contribute their perspectives. This inclusive approach ensures that diverse perspectives are included, leading to services that better align with the practical needs of various professional groups.

Furthermore, professionals reported that when their insights were appreciated and integrated into the development work, it fostered a sense of ownership and engagement with the service. In contrast, a lack of involvement often resulted in resistance, frustration, and perceptions that the service was irrelevant to their daily work. Services perceived as useful and beneficial to their workflows were more likely to be adopted and recommended, further underscoring the importance of inclusive user involvement.

Professionals' active engagement in the design and implementation process was identified as a critical element of successful digital service implementation. Professionals emphasized the need for opportunities to influence the service design, particularly through structured activities during working hours. Time constraints often limited their ability to participate meaningfully, leading to frustration and missed opportunities to contribute to the development process. Moreover, positive attitudes toward the digital service were identified as a significant enabler of successful implementation. These attitudes were closely tied to user involvement, indicating that professionals who participated in the design phase were more likely to view the service favorably. Conversely, negative attitudes often stemmed from a lack of involvement, concerns about usability, or poor past experiences with similar implementations. Professionals noted that addressing these barriers through proactive engagement and usability testing during the design phase could reduce resistance and enhance participation.

Post-implementation feedback mechanisms were considered vital for ensuring the ongoing success and usability of digital services. Professionals emphasized the importance of being able to provide feedback and having that feedback acted upon to improve the digital service. Accessible and smooth feedback channels were seen as critical for fostering continuous improvement and maintaining trust in the implementation process. Professionals also highlighted the importance of monitoring service use after implementation to ensure it was being used correctly and effectively. They noted that without follow-up or ongoing support, misunderstandings or incorrect usage could persist, potentially undermining the benefits of the service. Moreover, feedback opportunities and usability evaluations were essential for identifying and addressing these issues, allowing professionals to remain engaged and confident in the service.

5.2 Associations between implementation of digital services, user involvement, and healthcare and social welfare professionals' well-being

This section presents the results of the cross-sectional studies (Study II, III). The aim of the first cross-sectional study (Study II) was to provide quantitative data on the associations between CIS implementation phase, participation in CIS development, satisfaction with software providers' development work, and the well-being of social welfare professionals (Table 4). The second cross-sectional study (Study III) further explored the associations between different professional groups (Table 5). Moreover, it compared physicians, nurses, and social welfare professionals in terms of how their participation in HIS/CIS development and satisfaction with software providers' development work influenced their well-being.

Characteristics of professional groups

This section presents the background characteristics of the professionals who participated in quantitative studies (Study II, III).

Most of the professionals who participated in the survey were women: 93% of RNs (3,340 out of 3,610), 64% of physicians (2,978 out of 4,640), and 92% of SWPs (913 out of 990). Most professionals worked in the public sector: 86% of RNs (3,115/3,610), 80% of physicians (3,698/4,640), and 86% of SWPs (846/990). Regarding involvement in system development, participation rated varied across professional groups: nearly one-quarter of RNs (796/3610) and physicians (1,116/4,640) had participated in the development of a HIS, while a notably higher amount, about one-third of SWPs (326/990), had participated in the development of a CIS. (Table 3)

Table 3. Characteristics of the professional groups (original table from Study III).

	All (N=9,240)	RNs (N=3,610)	Physicians (N=4,640)	SWPs (N=990)
Gender, n (%)				
Female	7,231 (78.3)	3,340 (92.5)	2,978 (64.2)	913 (92.2)
Male	1,934 (20.9)	249 (6.9)	1,631 (35.1)	54 (5.5)
Other	75 (0.8)	21 (0.6)	31 (0.7)	23 (2.3)
Age, n (%)				
Under 35	1,882 (20.4)	739 (20.5)	958 (20.6)	185 (18.7)
35–44	2,403 (26.0)	833 (23.1)	1,224 (26.4)	346 (35.0)
45–54	2,529 (27.3)	1,108 (30.7)	1,161 (25.0)	260 (26.3)
Over 54	2,426 (26.3)	930 (25.7)	1,297 (28.0)	199 (20.0)
Working sector, n (%)				
Public	7,659 (82.3)	3,115 (86.3)	3,698 (79.7)	846 (85.5)
Private/other	1,581 (17.7)	495 (13.7)	942 (20.3)	144 (14.5)
Participation in HIS/CIS development, n (%)				
Yes, I have been given time for it	480 (5.2)	216 (6.0)	202 (4.3)	62 (6.3)
Yes, in addition to my work	1,758 (19.0)	580 (16.0)	914 (19.7)	264 (26.7)
No	7,002 (75.8)	2,814 (78.0)	3,524 (76.0)	664 (67.0)
Self-rated stress, n (%)				
No	3,299 (35.7)	1,037 (28.7)	1,830 (39.4)	432 (43.6)
Yes	5,941 (64.3)	2,573 (71.3)	2,810 (60.6)	558 (56.4)
Stress related to information systems, mean (SD)[a]		3.70 (1.13)	3.50 (1.07)	3.06 (0.97)
Satisfaction with software providers' development work, mean (SD)[b]		2.56 (1.07)	2.24 (1.02)	2.71 (0.86)

[a]=Range 1–6 (RNs) and 1–5 (physicians and SWPs)
[b]=Range 1–5 (all professional groups)

5.2.1 Associations and interactions between CIS implementation phase, participation in CIS development, satisfaction with software providers' development work, and SPWs' well-being

This study found that the CIS implementation phase was significantly associated with SRIS (Table 4). More specifically, the highest SRIS scores were of those participants who had recently experienced CIS implementation (within the preceding six months), as seen in Table 5. Furthermore, low levels of satisfaction with software providers' development work were associated with higher levels of both psychological distress and SRIS (Table 4).

Table 4. Association of independent main variables with SWPs' SRIS and distress (modified from Study II).

	SRIS		Distress	
Main variables	**F[a]**	**P value**	**F[a]**	**P value**
CIS implementation phase	23.80	**<0.001**	0.50	0.683
Participation in CIS development	0.21	0.648	0.04	0.844
Satisfaction with software providers' development work	55.48	**<0.001**	24.12	**<0.001**
R^2	0.278		0.204	

[a]The F value defines whether the variability between group means is larger than the variability of observations within the groups. To reject the null hypothesis that the group means are equal, a high F-value is needed (Miller & Chapman, 2001).

Table 5. Estimated means (EM) and standard errors (SE) of SRIS and psychological distress according to implementation phase (original table from Study II).

	SRIS		Distress	
Variables	**EM[a]**	**SE[b]**	**EM[a]**	**SE[b]**
CIS implementation phase				
Within the past 6 months	3.72	0.11	2.12	0.09
Within the past 12 months	3.41	0.10	2.17	0.08
Forthcoming within the next 12 months	3.09	0.09	2.10	0.07
No implementations	2.99	0.08	2.16	0.06

[a]Adjusted for CIS implementation phase, participation in IS development, satisfaction with software providers' development work, time pressure, gender, age and working environment.

[b]Means and standard errors are presented only for those variables that had a significant association with a dependent variable.

Significant interaction effects were observed between CIS implementation phase and participation in CIS development for SRIS (Figure 3). SWPs who were involved in CIS development and had recently experienced an implementation reported the highest SRIS. Interaction effects were also noted between CIS implementation phase and satisfaction with software providers' development work for psychological distress (Figure 4). The results also show that SWPs who were not satisfied with software providers and had recently experienced CIS implementation reported the highest psychological distress.

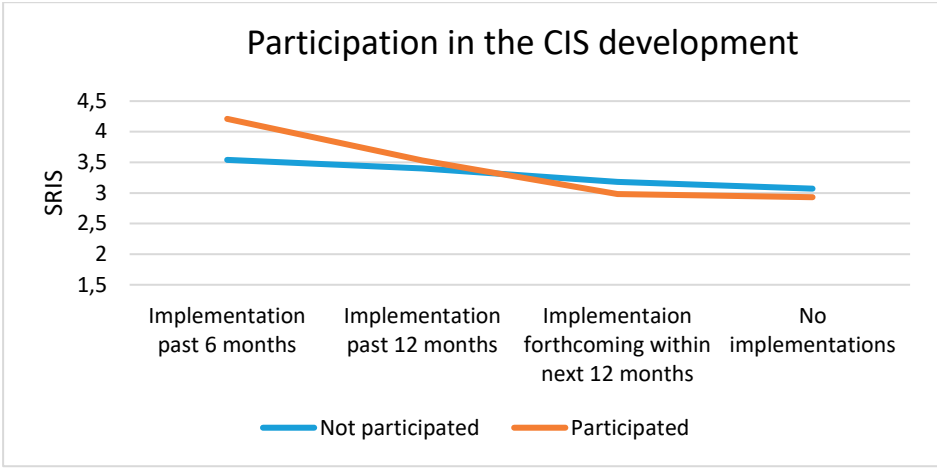

Figure 3. Interaction between implementation phase and participation in CIS development for SRIS. (Original figure from Study II)

SRIS (stress related to information systems) was measured on a 1–5 scale, where higher scores indicate more stress.

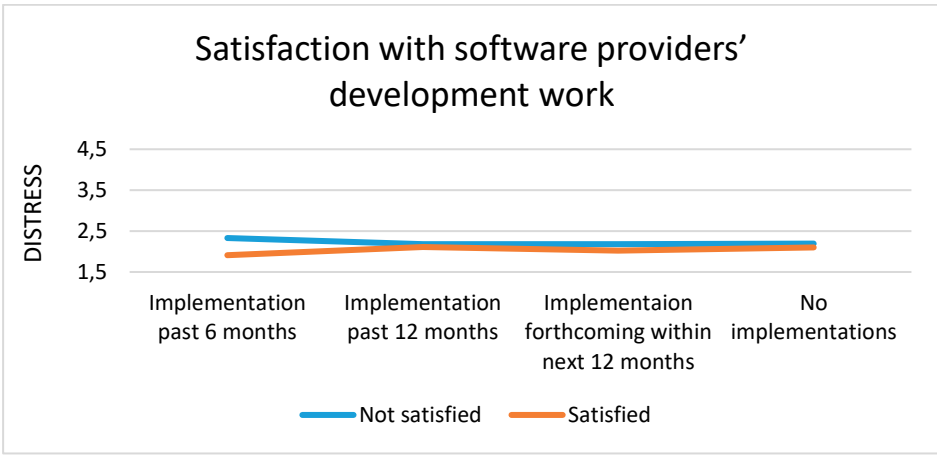

Figure 4. Interaction between implementation phase and satisfaction with software providers' development work for SRIS. (Original figure from Study II)

Higher distress scores indicate greater psychological strain (scale 1-5).

Satisfaction with software providers' development work was measured on a 1–5 scale, where higher scores indicate greater satisfaction. (To visually illustrate significant interactions, the continuous variable 'satisfaction with software providers' development work' was categorized using the median split.)

5.2.2 Associations and interactions between professional group, participation in IS development, satisfaction with software providers' development work, and well-being

Based on this study's findings, RNs were more likely to report self-rated stress compared to physicians and SWPs. They also had a greater likelihood of experiencing SRIS than physicians. Interestingly, those professionals who were not involved in IS development work reported less SRIS. In addition, higher satisfaction with the development work done by software providers was linked to lower levels of both self-rated stress and SRIS. (Table 6) Furthermore, significant interaction effects were found between professional groups and satisfaction with software providers' development work for SRIS (Figure 5). Physicians had a significantly lower likelihood of SRIS compared to RNs and SWPs if they were satisfied with software providers' development work (b=-0.12, 95% CL=-0.16, -0.08, P<.001).

Table 6. The results of fully adjusted models[a] of logistic and linear regression analysis for SRIS and self-rated stress (modified from Study III).

	SRIS		Self-rated stress	
Variable	**b[b] (95%CI[c])**	**P value**	**OR[d] (95%CI[c])**	**P value**
Professional group				
Registered nurses	0	-	1	-
Physicians	-0.11 (-0.16, -0.07)	**<.001**	-0.47 (-0.57, -0.36)	**<.001**
Social welfare professionals	0.007 (-0.07, 0.06)	0.828	-0.68 (-0.83, -0.53)	**<.001**
Participation in HIS/CIS development				
Yes, I have been given time for it	0	-	1	-
Yes, in addition to my own work	-0.02 (-0.11, 0.07)	0.646	0.11 (-0.11-0.32)	0.323
No	-0.14 (-0.23, -0.06)	**<.001**	-0.06 (-0.26-0.14)	0.564
Satisfaction with software providers' development work	-0.36 (-0.38, -0.34)	**<.001**	-0.23 (-0.28, -0.19)	**<.001**
R^2	0.15		0.03	

[a]Adjusted for gender, age, working sector, professional group, participation in HIS/CIS development, and satisfaction with software providers' development work.
[b]Regression coefficients represent the predicted change in the value of a dependent variable for each one unit increase in the value of an independent variable. A negative association means that when the independent variable's value increases, the dependent variable's value decreases.
[c]The confidence interval describes the amount of uncertainty associated with a sampling method.
[d]The odds ratio represents the odds ratio for one unit change in the continuous independent variable, indicating the odds of passing from low stress to high stress.

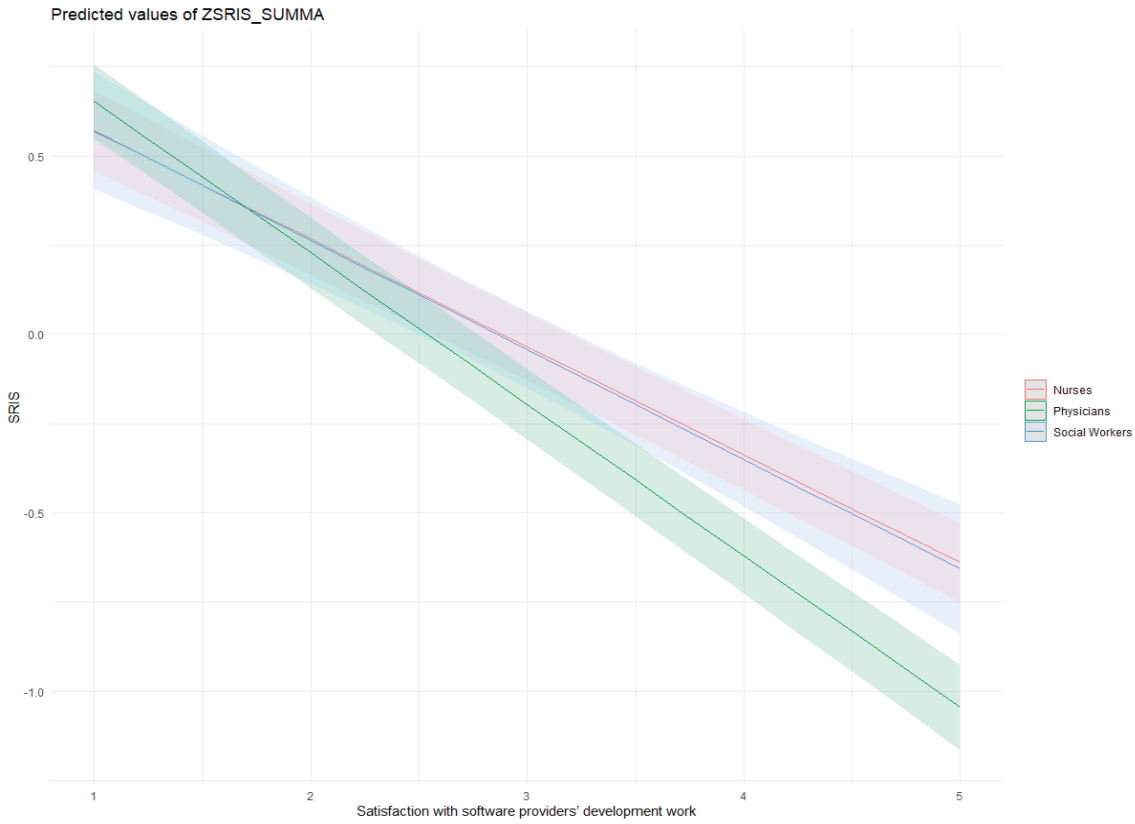

Figure 5. Interaction between professional group and satisfaction with software provider's development work for SRIS. (Original figure from Study III)

The SRIS's mean measure was standardized using z scores, where the value of the z score describes how many SDs the score is away from the mean [mean always=0]). A higher score indicates higher SRIS (-1.5-1.0) and satisfaction (1-5).

5.3 Summary of the results

In summary (Figure 6), the findings indicate that healthcare and social welfare professionals' opportunities to participate in development work, the phase of implementation, and professionals' satisfaction with software providers' development work significantly influence their well-being. Professionals reported a stronger sense of ownership and engagement when their perspectives were acknowledged and incorporated into service design, whereas a lack of participation opportunities and feedback mechanisms led to frustration and resistance. Recently experienced implementation, dissatisfaction with software providers' development work, and participation in development work were all associated with reduced professional well-being.

The qualitative study underscored the importance of meaningful opportunities for professionals to contribute during the design and implementation phases. Champion professionals with expertise and enthusiasm for the digital services played an important role in driving adoption. However, professionals emphasized the need for broader inclusion to ensure that diverse perspectives and practical needs are represented. When professionals felt their input on how the service should be designed was acknowledged and integrated into the design process, they reported a stronger sense of ownership and engagement with the system. In contrast, limited opportunities for participation and the absence of feedback mechanisms often resulted in frustration, resistance, and negative experiences of the implementation process. Post-implementation feedback and monitoring also emerged as essential elements of successful digital service implementation. Effective feedback channels and ongoing usability evaluations were crucial for maintaining engagement and ensuring that systems were smoothly integrated into the daily workflows of professionals. All professionals highlighted the importance of follow-up support and opportunities to refine the system based on user experiences, which fostered trust and sustained engagement.

The quantitative analyses revealed that the early phases of implementation were associated with the highest levels of SRIS among SWPs. Participation in development work was associated with increased stress by all professional groups. Moreover, satisfaction with the responsiveness of software providers to feedback and system improvements emerged as an important factor impacting professionals' well-being. Low

satisfaction in this area was strongly associated with higher stress levels. Significant differences between professional groups were also identified. Physicians reported significantly lower levels of stress compared to RNs and SWPs when the collaboration with the system vendor regarding development work was perceived as useful.

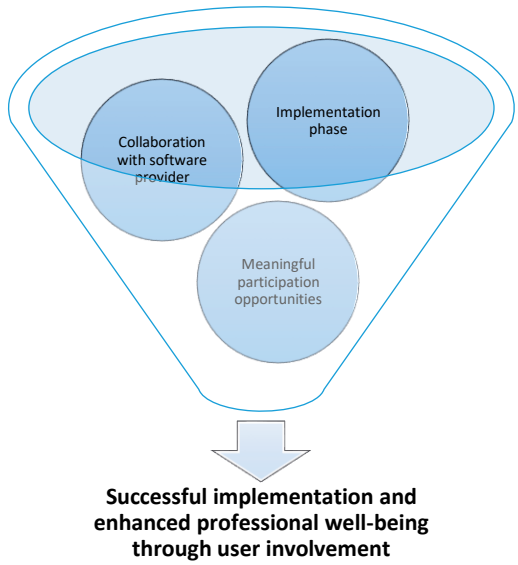

Figure 6. Summary of the findings (Study I, II, III).

6 DISCUSSION

This chapter discusses the key findings of the studies in relation to previous literature and the applied theoretical frameworks. The discussion is structured around the cognitive participation concept of the NPT (May et al., 2009) and the JD-R model (Demerouti et al., 2001), which together provide a dynamic, multi-level perspective to interpret professionals' engagement and well-being during digital service implementation. The chapter concludes with theoretical and practical implications, ethical considerations, trustworthiness, and suggestions for future research. More detailed discussions of the individual publications can be found in Studies I–III.

This dissertation aimed to deepen understanding of healthcare and social welfare professionals' experiences with digital service implementation, focusing on user involvement and its implications for professional well-being, as well as differences in these experiences between physicians, RNs, and SWPs.

6.1 Professionals' experiences of user involvement in digital service implementation and its impact on well-being

The findings of this dissertation highlight the complex relationship between user involvement and professionals' well-being during digital service implementation. While user involvement is widely valued, its effects depend strongly on when, how, and under what conditions professionals are engaged. Interpreted through the lens of cognitive participation from NPT (May et al., 2009) and the JD-R model (Demerouti et al., 2001), the results reveal that engagement can act either as a job resource or as a job demand. When adequately supported, involvement enhances professionals' sense of purpose, autonomy, and control; when poorly supported, it becomes an additional strain that increases workload and stress (Studies I-III).

Cognitive participation helps explain how professionals engage with and commit to new practices, while the JD–R model clarifies why similar implementation processes

yield different outcomes depending on the balance between job demands (e.g., time pressure, documentation burden) and job resources (e.g., leadership support, training, peer collaboration). Together, these frameworks illuminate why user involvement is often treated as positive but can simultaneously foster engagement and cause strain. This understanding is particularly relevant in Finland's large-scale digitalization of wellbeing services, where thousands of professionals across healthcare and social welfare sectors are expected to participate in parallel implementations. Under such conditions, engagement must be supported through realistic scheduling, protected time for training, and transparent feedback mechanisms. Otherwise, participation risks becoming symbolic rather than meaningful.

Viewed through this combined perspective, this dissertation identified four interrelated factors crucial for meaningful user involvement:

1. initiating meaningful participation,
2. enrolling with structured organizational support,
3. legitimizing contributions through responsive feedback mechanisms, and
4. activating and sustaining engagement during implementation.

Initiating meaningful participation

The initiation phase of cognitive participation captures how professionals begin to interpret and engage with a new practice while establishing a shared sense of purpose (May et al., 2009). Consistent with this, the findings from Study I indicate that early opportunities for user involvement are crucial for building coherence and ensuring that digital services are meaningfully integrated into everyday work. While previous research has emphasized the importance of digital champions in facilitating engagement (Cresswell et al., 2017; de Leeuw et al., 2020), the results of this dissertation suggest that restricting participation to a few selected individuals can limit collective ownership and shared understanding. Instead, professionals valued inclusive and diverse participation, where multiple perspectives were represented, and all professional groups were able to contribute to shaping the implementation process (Study I).

From a JD–R perspective, involvement in development work can act as a job resource that enhances autonomy and control. Yet, as shown in Studies II–III, involvement does not automatically enhance well-being. Professionals who were not

engaged in system development reported less stress than those involved. This contradiction illustrates that participation can empower but also exhaust, particularly when time and organizational support are insufficient (Studies II–III). Consequently, user involvement should be seen as a dynamic, context-dependent process whose effects depend on timing, scope, and the availability of supporting resources.

This perspective extends prior research that often treats early involvement as a straightforward predictor of success (Cresswell & Sheikh, 2013). Instead, these findings highlight that engagement and well-being are mutually reinforcing well-structured participation with clear goals and adequate support fosters ownership and motivation, whereas poorly organized involvement becomes an additional job demand. In Finland's large-scale digital programs, ensuring early yet realistic participation requires careful coordination and transparent communication about the purpose and limits of involvement.

Enrolling with structured organizational support

Enrolment refers to how organizations mobilize commitment and resources to sustain engagement (May et al., 2009; Murray et al., 2010). Across Studies I–III, professionals' willingness to participate was strongly linked to structural support, including sufficient time and manageable workloads. When such resources were lacking, participation became burdensome, increasing strain and reducing motivation to engage. This expands earlier NPT-based research by showing that enrolment is not merely about recruiting participants but ensuring that engagement occurs without excessive strain (Laukka et al., 2020; Nguyen et al., 2024; Kaihlanen et al., 2020).

Within the JD–R framework, organizational resources such as time, training, and managerial support act as buffers against high demands and promote motivation (Laukka et al., 2020). When these resources are insufficient, user involvement can transform from a potential resource into an additional demand that heightens stress and undermines engagement (Nguyen et al., 2024). In Finland's wellbeing services counties, where large-scale digital transformations are underway, professionals are required to balance daily patient and client work with ongoing system training and change management. Therefore, engagement must be institutionally supported through realistic scheduling, prioritization, and leadership commitment.

In the context of user involvement, it is also important to consider that national legislation such as the Act on the Electronic Processing of Client Data in Healthcare and Social Welfare (Client Data Act, 703/2023) and the Decree on the Rights to Access Client Data in Healthcare and Social Welfare (Access Rights Decree, 825/2022) defines how systems can be developed and modified, thereby limiting local flexibility. As a result, professionals may perceive participation as constrained or even symbolic when their ability to influence system design is restricted by national technical and legal frameworks.

Legitimizing contributions through responsive feedback

Legitimation, another key component of cognitive participation, concerns whether professionals perceive their involvement as meaningful and valued (May et al., 2009; Murray et al., 2010). This dissertation shows that when professionals' feedback was acknowledged and visibly integrated into development processes, it strengthened ownership and trust. Conversely, when feedback was ignored or its impact remained unclear, participation was perceived as performative and discouraging (Study I). Within the JD–R framework, feedback and recognition function as essential job resources that justify effort, sustain motivation, and protect against emotional exhaustion.

Professionals' perceptions of legitimacy were shaped by both local interaction patterns and broader organizational responsiveness (Studies I–III). In large-scale implementations, feedback often travels through multiple layers of management and vendor communication, which can slow responsiveness and increase frustration (Cresswell et al., 2017; Nguyen et al., 2024). Moreover, Studies II–III demonstrated that weak collaboration with software providers was associated with higher system-related stress and reduced satisfaction with digital services.

Moreover, requirements such as Kanta integration and national data protection legislation also shape how user feedback can be utilized in practice (Kanta Services, 2025; Client Data Act, 703/2023; Access Rights Decree, 825/2022). Thus, legitimacy is not only about whether feedback leads to concrete system changes, but also about transparent and respectful communication regarding decision-making. Again, when professionals understand why certain suggestions cannot be implemented, trust and engagement can still be maintained despite structural constraints. Responsive feedback loops therefore serve as vital organizational resources that balance the cognitive and emotional demands of digital transformation. When absent, they erode trust and contribute to doubt and disengagement. Sustaining legitimacy consequently requires not

only technical responsiveness but also communicative transparency and mutual respect across all levels of the implementation process.

Activating and sustaining engagement over time

Activation refers to the phase in which engagement is maintained and digital systems become embedded in everyday routines (May et al., 2009). The findings of this dissertation highlight that post-implementation support such as feedback mechanisms, peer collaboration, and continuous technical assistance is essential for sustaining both effective system use and professional well-being (Studies II–III). Within the JD–R framework, this stage determines whether digital service implementation stabilizes as a motivating process or evolves into a persistent source of strain. Continuous learning opportunities, responsive feedback, and collaborative peer networks function as renewable job resources that enhance adaptability, confidence, and engagement (Laukka et al., 2020; Jedwab et al., 2023). Conversely, unresolved usability issues, weak communication, and insufficient support accumulate as ongoing demands, leading to frustration and disengagement (Nguyen et al., 2024; Kaihlanen et al., 2020).

This dissertation extends the NPT concept of activation by demonstrating that engagement is not a one-time achievement, but an evolving process shaped by leadership responsiveness, organizational culture, and collaboration with system vendors (Studies I–III). Sustained engagement requires active maintenance through ongoing dialogue, shared responsibility, and visible responsiveness to professional feedback. In digital services implementations, maintaining this continuity is particularly challenging as governance structures, vendor relationships, and local operational realities must be balanced over time.

Even when national governance and standardization frameworks restrict certain system modifications, transparent communication about these constraints helps sustain trust and motivation among professionals. Ultimately, long-term engagement depends on a continuous balance between job demands and resources, individual agency and organizational support, and local adaptability and national standardization.

6.2 Differences in user involvement and well-being across professional groups

When comparing physicians, registered nurses (RNs), and social welfare professionals (SWPs), the findings of this dissertation demonstrate that experiences of user involvement and its impact on well-being are not uniform but shaped by professional roles, hierarchies, and organizational contexts. Interpreted through cognitive participation and the JD–R model, these differences reflect both the distribution of influence and visibility during implementation and the unequal access to resources that buffer job demands.

From the perspective of initiation, enrolment, legitimation, and activation, these processes are experienced differently across professional groups. Physicians, particularly those in leadership or development roles, tend to be involved earlier, during the initiation and enrolment phases, where strategic decisions and system configurations are made (Martikainen et al., 2025). Their institutional authority grants access to decision-making forums and vendor negotiations, enabling greater influence over design and customization. This early and visible involvement supports their sense of coherence and legitimacy, as highlighted in earlier studies (Cresswell & Sheikh, 2013; Nguyen et al., 2021; Martikainen et al., 2025). In contrast, RNs and SWPs are more often engaged later, during the activation phase, when the focus shifts from design to adaptation. This late-stage participation limits opportunities for influence and often results in feelings of exclusion, frustration, and uncertainty regarding the system's fit with practical work routines (Abbott et al., 2015; Gui et al., 2020; Frennert, 2023; Gillingham, 2021).

Through the lens of the JD–R model, these differences are further illuminated by variations in job demands and available resources. Physicians typically experience greater autonomy and access to key job resources that protect against stress and foster engagement (Heponiemi et al., 2021; Nguyen et al., 2021; Cresswell & Sheikh, 2013; Martikainen et al., 2020). RNs and SWPs, on the other hand, work in environments where time constraints, documentation load, and limited control increase job demands (Kujala et al., 2020; Heponiemi et al., 2019). When user involvement is added to these pre-existing pressures without compensatory resources, such as protected time, support, or recognition, risks becoming an additional strain rather than a meaningful opportunity. This pattern is reflected in our findings indicating that while all professional groups valued involvement (Study I), they also reported higher stress levels when engaged in development work, particularly when organizational or vendor support was insufficient

(Studies II–III). In JD–R terms, this demonstrates how participation can shift from a resource to a demand depending on context and support structures. Engagement that is well-resourced and transparent enhances ownership and motivation, whereas unsupported participation amplifies workload and strain.

Moreover, across all professional groups, effective collaboration with system vendors emerged as a critical factor for reducing SRIS (Studies II–III). Physicians appeared particularly sensitive to how collaboration with system providers functioned. When communication and feedback loops broke down, their stress levels tended to increase more sharply than in other professional groups. This likely reflects their closer involvement in strategic decision-making and higher expectations of influence. Conversely, when collaboration worked smoothly and feedback was acted upon, stress decreased across all groups, demonstrating how organizational and inter-organizational communication can function as a powerful job resource that supports well-being and trust in digital service implementation.

Overall, these findings suggest that experiences of cognitive participation are closely linked to well-being outcomes. When opportunities for meaningful engagement, acknowledgement, and effective collaboration are lacking, user involvement may become an additional job demand, increasing stress and undermining motivation. Conversely, when participation is supported by clear roles, timely feedback, and responsive collaboration structures, it enhances professionals' sense of control, ownership, and well-being during digital service implementation. These findings illustrate that engagement operates as a double-edged process: it protects well-being when supported by adequate resources, autonomy, and feedback, but becomes a risk factor when imposed, under-resourced, or symbolically implemented.

6.3 Theoretical and practical contributions

This dissertation contributes to both theoretical and practical understanding of digital service implementation in healthcare and social welfare. The findings demonstrate how combining the concept of cognitive participation with the JD–R model enables a more holistic analysis of how digital systems become embedded in professional practice and how these processes affect professionals' well-being.

Theoretical implications

• Integrating implementation and well-being frameworks

This dissertation demonstrates the value of combining NPT's cognitive participation with the JD–R model when examining digital services implementation in demanding health and social care contexts. While cognitive participation explains how professionals engage with and make sense of new digital practices, the JD–R model clarifies how such engagement affects well-being depending on the balance between job demands and available resources. Integrating these perspectives provides a more complete understanding of why similar implementation processes may lead either to engagement or to exhaustion and supports a shift from adoption-focused to well-being-oriented implementation research.

• Extending NPT's concept of cognitive participation

The findings suggest that cognitive participation depends not only on motivation and shared purpose but also on structural and emotional viability, that is, sufficient time, feedback, and organizational support to sustain meaningful engagement. Without these enabling resources, participation may become burdensome or symbolic. Incorporating this resource-sensitive dimension into NPT would strengthen its capacity to explain engagement dynamics. This theoretical extension is particularly relevant for implementation researchers and policymakers seeking to understand how engagement processes connect with professionals' well-being in complex organizational settings.

Practical implications

Building on these theoretical insights, the following recommendations are intended for healthcare and social welfare organizations, Wellbeing Services Counties, IT-management units, and system vendors involved in planning and implementing digital services.

• Integrate user involvement throughout all phases of implementation

Professionals should be involved from early design to post-implementation evaluation to ensure that digital services reflect real workflows and professional needs. Engagement should not be limited to selected "digital champions" but broadened to include diverse professional perspectives, supporting both usability and ownership.

• Provide structured and well-resourced participation opportunities

User involvement must be institutionally supported through protected time, clear roles, and workload adjustments. Without such structures, participation risks becoming an additional burden rather than a motivating experience.

• Strengthen post-implementation feedback and support processes
Continuous usability evaluations, feedback channels, and peer collaboration sustain engagement and system quality. Active software provider collaboration and responsiveness to feedback are essential to maintaining professionals' trust and motivation over time.

• Ensure feedback mechanisms are responsive and transparent
User involvement must lead to visible outcomes or clear communication about decision-making. When professionals understand how and why their input has been used or why certain changes cannot be made trust and engagement remain intact.

• Tailor implementation strategies to professional contexts
Different professional groups face distinct demands and resources. Physicians benefit from direct involvement in system design and vendor collaboration, whereas RNs and SWPs often require stronger managerial support, time resources, and peer learning opportunities.

• Recognize that engagement requires continuous maintenance
Participation is not a one-time achievement but an ongoing process that must be sustained through leadership attention, organizational learning, and emotional support. Investing in long-term structures for feedback, peer mentoring, and system refinement promotes both successful digitalization and professionals' well-being.

6.4 Ethical considerations of the research

Ethical research practices were given careful consideration throughout the research process. This section outlines the ethical principles and measures undertaken, focusing on participant consent, data protection, anonymity, and an ethical review process. The study followed the ethical guidelines set by the Finnish National Board on Research Integrity (2023) and followed its guidelines on good scientific practice.

In the qualitative phase, ethical approval was obtained from the Research Ethics Committee of the Finnish Institute for Health and Welfare (approval number THL/2304/6.02.01/2020). Additionally, research permissions were granted by the participating organizations to ensure that institutional requirements and ethical standards were met. Moreover, all the participants received written and verbal information about the study, its purpose, and how it would be conducted. They were also told they had the right to withdraw from the study at any time without consequences. Written informed consent was obtained from all participants prior to data collection, with specific consent for audio recordings. The focus group setting was facilitated with care to ensure psychological safety and mutual respect among participants. To ensure confidentiality, all identifiable information was removed from the transcripts, and participants were anonymized using role-based identifiers (e.g., 'nurse,' 'physician'). Interviews were audio-recorded with permission and securely stored on encrypted university servers. Moreover, the data was securely stored on encrypted systems with access limited to the research team only.

In the quantitative phase, ethical approval for the RN and WSP surveys was provided by the Finnish Institute for Health and Welfare (approval number THL/482/6.02.01/2020). However, for the physician survey, no formal ethics committee approval was required, as the study involved the collection of professional opinions through a questionnaire without anticipated risks or harm. This approach aligns with national research integrity guidelines, which specify that opinion surveys which do not involve sensitive personal data or potential adverse effects do not require ethical review (Finnish National Board on Research Integrity TENK, 2023). Participation in the electronic surveys was voluntary, and responses were anonymous. No identifiable personal data was collected. The large-scale datasets used in the analysis were handled in compliance with data protection regulations, including the EU General Data Protection Regulation (GDPR). Data was securely stored and only accessed by the research team. All the data is securely archived and will be destroyed according to best practices to ensure the continued protection of participant information.

Furthermore, in both phases, special attention was paid to the ethical implications of involving healthcare and social welfare professionals, recognizing that discussing digital service implementation and professional well-being may touch upon sensitive topics related to workload, stress, and job satisfaction. To minimize potential stress,

participants were assured that their responses would remain confidential and would not be linked to their organizations or supervisors.

6.5 Trustworthiness, strengths, and limitations of the study

This section addresses the trustworthiness, strengths, and limitations of the research with a focus on data collection procedures, research instruments, and analytical approaches. The discussion is divided into two parts: first, the trustworthiness of the qualitative phase is examined, followed by an evaluation of the quantitative phase's validity and reliability.

6.5.1 Phase I: Descriptive study

The qualitative phase followed Lincoln and Guba's (1985) framework which specifies four criteria of trustworthiness and is widely recognized as the gold standard for assessing accuracy in qualitative research. These criteria are credibility, dependability, confirmability, and transferability, and together create a comprehensive and practical framework for evaluating the quality and transparency of qualitative findings, particularly in applied health and social care research

Credibility (how believable and accurate results are) was ensured through data triangulation across multiple professional groups and regions, ensuring diverse perspectives and reducing potential biases (Patton, 2002). The research team held regular meetings to discuss coding frameworks and thematic interpretations, enhancing interrater reliability and consistency in the analysis (Nowell et al., 2017). Moreover, quantitation was used in the results section to ensure that the results were authentic. *Dependability* (can someone else follow your process and get similar results?) was guaranteed through accurate documentation of the research process, from the design phase to data analysis, creating an audit trail for transparency. The inclusion of three interviewers, one of whom was highly experienced, enhanced the reliability of the data collection process. Structured interview guides were used to maintain consistency, while detailed coding protocols helped minimize variability (Miles et al., 2014). *Confirmability* (are the findings grounded in data, not the researcher's personal views?) was ensured by

maintaining reflexive practices, such as maintaining research journals and conducting regular team discussions to reflect on potential biases. Transparency in data interpretation and audit trails helped ensure that findings were data-driven rather than influenced by researcher assumptions (Berger, 2015). Additionally, the inclusion of professionals from various groups and regions strengthened confirmability by reducing the risk of subgroup bias. *Transferability* (can someone use your findings in a similar situation elsewhere?) was supported by purposive sampling, which captured a wide range of healthcare and social welfare professionals. This sampling strategy enhances the relevance of the findings to similar high-digitalization contexts. However, the studies focus on Finland, a global leader in digital health services (European Commission, 2023), may also limit the generalizability of findings to regions with lower levels of digitalization or differing healthcare infrastructures.

Furthermore, one of the limitations of the qualitative phase was that some of the interviews had to be performed via Microsoft Teams due to increasing COVID-19 restrictions in Finland. While remote interviewing enabled data collection to continue during the pandemic, it may have constrained some of the natural, spontaneous interactions that typically emerge in face-to-face focus group settings. The lack of physical presence may have inhibited non-verbal communication, limited participants' ability to build connection, and reduced the development of dynamic group exchanges. Although the interviewers employed structured prompt and facilitation strategies to foster discussion, and were experienced in moderating group conversations, the virtual format may have influenced the depth and flow of dialogue, thereby potentially affecting the richness of the data. Technical challenges, such as connectivity issues or audio lags, may also have subtly disrupted conversational dynamics.

In addition, the qualitative material may reflect variation in digital services under discussion. The focus group participants may have been involved in different types of digital service implementation, ranging from externally funded innovative projects to large-scale, mandatory system implementations such as ISs. These contexts differ considerably in terms of workload, autonomy, and the stability of implementation. In voluntary pilot projects, professionals may experience engagement as motivating and flexible, whereas participation in legally mandated system implementations may be more demanding, involving detailed data migration or documentation tasks alongside daily responsibilities. Such contextual heterogeneity may have influenced the perceived intensity of work demands and the ways in which professionals described their involvement and well-being.

Finally, while peer debriefing sessions among the research team supported analytical consistency, interrater reliability could have been further strengthened by implementing double coding procedures where two or more researchers independently code the same transcripts and compare interpretations. This would have added another layer of methodological rigor and enhanced the dependability of the thematic analysis.

6.5.2 Phase II: Cross-sectional studies

In quantitative studies, validity refers to whether a study truly measures what it intends to measure, or in other words, how truthful its results are (Golafshani, 2015). Reliability, according to Kirk and Miller (1986), can be assessed through three dimensions: (1) consistency of repeated measurements, (2) stability of results over time, and (3) similarity of outcomes across different measurements. In the quantitative phase of this dissertation, several measures were applied to enhance validity and reliability.

Regarding *content validity* (whether survey items were understood as intended), the study utilized items from previously validated national and international questionnaires that have been successfully used among healthcare and social welfare professionals (e.g., Hyppönen et al., 2019; Elo et al., 2003; Goldberg et al., 1997). Although no separate pilot testing was conducted, the use of these established items strengthens the assumption that the questions were both comprehensible and contextually appropriate for the target population.

Construct validity (whether the survey measures what it is supposed to measure) was supported by adjusting statistical models for known confounders such as age, gender, sector, and perceived time pressure, factors previously associated with professional well-being (Heponiemi et al., 2021; Kaihlanen et al., 2020; Vehko et al., 2019). Internal validity (whether findings are not caused by external factors) was improved through multiple imputations of missing data using all relevant variables, reducing bias from item non-response. Statistical validity was ensured by verifying regression assumptions (linearity, homoscedasticity, multicollinearity, and normality of residuals), all of which were met.

Interpretive validity (accuracy of interpretation) was strengthened using ANCOVA models and interaction analyses with centered variables, enabling nuanced interpretation of both main and interaction effects. Standardization of SRIS scores using z-scores enhanced measurement validity by allowing comparison across professional groups with

differing response scales. While full psychometric statistics (e.g., Cronbach's alpha) were not available for all instruments, the use of established national items implies an acceptable level of instrument reliability. Methodological consistency including multiple imputation, variable centering, and verification of low VIF values (1.0–1.02) further supports the stability and reproducibility of the findings.

The quantitative phase also involved several limitations. First, although validated survey instruments were used, the variable "Participation in the CIS development" did not clearly classify between participation in local implementation activities and collaboration directly with system vendors. Many respondents may have perceived all development-related tasks as "vendor collaboration," potentially introducing misclassification bias. Second, the sample was mostly female yet reflecting the gender composition of Finland's health and social welfare workforce. However, previous research indicates that women tend to report higher levels of psychological distress and burnout than men (Heponiemi et al., 2021), which may have contributed to elevated stress and well-being scores in the dataset.

Third, despite the large sample size (n = 9,240), response rates varied between professional groups, with lower participation among RNs and SWPs. This may have introduced sampling bias, affecting the representativeness of the findings. The recruitment strategy, based on email invitations and social media channels, may also have led to uneven dissemination of the survey link. Fourth, the cross-sectional design captures data at a single point in time, limiting the ability to infer causal relationships between user involvement, stress, and well-being (Bryman, 2016). While the associations are informative, they cannot confirm directionality or temporal effects. The reliance on self-reported data further introduces potential biases such as social desirability and recall errors (Podsakoff et al., 2003).

Fourth, the data collection period (March 2020–February 2021) coincided with the COVID-19 pandemic a period marked by high workloads, rapid digital transitions, and exceptional stress. These circumstances likely amplified stress-related responses and shaped professionals' perceptions of digital service implementation. Simultaneous large-scale digital transformations and the ongoing workforce shortage may also have influenced reported experiences, potentially blurring distinctions between different implementation contexts. Finally, the qualitative and quantitative phases examined partly different types of digital service implementations. Therefore, practical recommendations

such as prioritizing meaningful user involvement across all phases should be interpreted with this contextual variation in mind.

6.6 Future research

While this dissertation provides valuable insights into digital service implementation and its impact on healthcare and social welfare professionals, several areas warrant further exploration to deepen both theoretical understanding and practical application. In line with the pragmatist research philosophy adopted in this work, future studies should move beyond describing current practices toward developing actionable strategies that foster meaningful engagement, sustainable implementation, and professional well-being.

First, future research should examine how to design and sustain meaningful user involvement in large and complex organizations where not all professionals can participate directly. Although user involvement is widely studied, there is still limited knowledge of which facilitation practices, governance structures, and feedback mechanisms ensure effective engagement on a scale. Experimental or intervention-based designs could be used to test models such as representative participation, digital co-creation platforms, or tiered feedback systems to identify strategies that best balance inclusiveness, efficiency, and well-being.

Second, as digital services across healthcare and social welfare systems become increasingly unified, it is important to understand how product ownership and requirements management evolve. Future studies could explore how decision-making shifts away from frontline professionals and what governance mechanisms such as structured co-design channels or product owner networks can preserve the user perspective. This line of inquiry would clarify how requirements are prioritized and negotiated between vendors, management, and end-users, ensuring responsiveness to real-world needs despite standardization and scale.

Third, further research should analyze the balance between vendor-driven development and service-provider participation. Studies could investigate at which stages end-user input is most valuable early design, implementation, or post-launch optimization and how contractual and resource.

7 CONCLUSIONS

This study deepens understanding of healthcare and social welfare professionals' experiences with digital service implementation, focusing on user involvement and its impact on well-being. The findings reveal that while user involvement is widely valued, its effectiveness depends critically on when, how, and under what conditions it occurs. Rather than being fundamentally beneficial, user involvement can function as a job strain when it is poorly supported, symbolic, or concentrated in the early and most stressful stages of implementation.

The study's relevance is further strengthened by its timing within the broader context of Finland's SOTE reform, which has restructured service delivery through the establishment of the Wellbeing Services Counties. These reforms aim to enhance integration, accessibility, and cost-efficiency in health and social care (Ministry of Social Affairs and Health, 2024). As digital services play an increasingly central role in achieving these goals, it is vital to ensure that the professionals responsible for implementing and sustaining them are meaningfully engaged, adequately trained, and institutionally supported.

In this evolving service landscape characterized by simultaneous digitalization and structural integration, the study underscores the need for comprehensive, well-resourced, and context-sensitive implementation strategies. Tailoring engagement to the diverse realities of professional groups and ensuring that feedback mechanisms are responsive are not only key to successful system adoption but also essential for protecting professional well-being. The insights from this research can inform policymakers, healthcare and social welfare organizations, and system vendors as they work toward sustainable, human-centered digital transformation in Finland and beyond.

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ORIGINAL PUBLICATIONS

PUBLICATION I

How to Implement Digital Services in a Way That They Integrate Into Routine Work: Qualitative Interview Study Among Health and Social Care Professionals

Nadav J., Kaihlanen A-M., Kujala S., Laukka E., Hilama P., Koivisto J., Keskimäki I., Heponiemi T.

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Original Paper

How to Implement Digital Services in a Way That They Integrate Into Routine Work: Qualitative Interview Study Among Health and Social Care Professionals

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Abstract

Background: Although the COVID-19 pandemic has significantly boosted the implementation of digital services worldwide, it has become increasingly important to understand how these solutions are integrated into professionals' routine work. Professionals who are using the services are key influencers in the success of implementations. To ensure successful implementations, it is important to understand the multiprofessional perspective, especially because implementations are likely to increase even more.

Objective: The aim of this study is to examine health and social care professionals' experiences of digital service implementations and to identify factors that support successful implementations and should be considered in the future to ensure that the services are integrated into professionals' routine work.

Methods: A qualitative approach was used, in which 8 focus group interviews were conducted with 30 health and social care professionals from 4 different health centers in Finland. Data were analyzed using qualitative content analysis. The resulting categories were organized under the components of normalization process theory.

Results: Our results suggested 14 practices that should be considered when implementing new digital services into routine work. To get professionals to understand and make sense of the new service, (1) the communication related to the implementation should be comprehensive and continuous and (2) the implementation process should be consistent. (3) A justification for the service being implemented should also be given. The best way to engage the professionals with the service is (4) to give them opportunities to influence and (5) to make sure that they have a positive attitude toward the service. To enact the new service into professionals' routine work, it is important that (6) the organization take a supportive approach by providing support from several easy and efficient sources. The professionals should also have (7) enough time to become familiar with the service, and they should have (8) enough know-how about the service. The training should be (9) targeted individually according to skills and work tasks, and (10) it should be diverse. The impact of the implementation on the professionals' work should be evaluated. The service (11) should be easy to use, and (12) usage monitoring should happen. An opportunity (13) to give feedback on the service should also be offered. Moreover, (14) the service should support professionals' work tasks.

Conclusions: We introduce 14 practices for organizations and service providers on how to ensure sustainable implementation of new digital services and the smooth integration into routine work. It is important to pay more attention to comprehensive and continuing communication. Organizations should conduct a competence assessment before training in order to ensure proper alignment. Follow-ups to the implementation process should be performed to guarantee sustainability of the service. Our findings

from a forerunner country of digitalization can be useful for countries that are beginning their service digitalization or further developing their digital services.

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KEYWORDS

digital services; implementation; health and social care professionals; integration; normalization process theory; interview; social work; health care; focus groups

Introduction

Background

The number of new digital services has been rapidly growing in the health care setting in recent years. Moreover, the COVID-19 pandemic has significantly boosted the implementation of digital services with unprecedented speed and influence [1,2]. The pandemic has also taken the usefulness and potentials of digital services to a whole new level. In doing so, it has also provided an opportunity to add these services to health care systems in the long term [3]. However, despite the pandemic having recently favored the transition to digital solutions [4], digitalization in health care has been slow and complicated, even though major investments have been made [5].

Implementations of digital services tend to fail more often in the health care setting than in other settings because the environment is complex, and therefore the integration into practice is difficult and slow [6-8]. Failure to implement may even lead to a reduction in quality, safety, and efficiency in care [9]. According to the World Health Organization (WHO), guidance for digital health, research, and assessment of the impact of digital service implementations on health care are essential [4]. It is important to identify barriers and success factors when implementing new digital services [10].

A recent systematic review provided a list of barriers and success factors for the implementation of digital services from the organizational point of view [11]. The most mentioned barrier was limited knowledge of the service, and the most mentioned success factor was the services' ease of use. Resistance from professionals is a major problem for organizations, and therefore it is important to understand their point of view [12]. Health and social care professionals are key influencers in the implementation [13-15] because their attitudes and behaviors influence patients' capacity to use services and their trust in the services [15,16].

Previous findings show that implementation should include users' participation at different implementation phases, using champions or other key staff, providing sufficient training and support, and monitoring the use of the system at the early stages of implementation [13,15,17-19]. However, these studies have mainly focused on examining implementation in certain groups of professionals [11,20] or a single digital service in a particular environment [21-25]. There are relatively few recent studies about health and social care professionals' experiences of the implementation of the digital services from a multiprofessional perspective, especially now when the number of implementations has grown and different professional groups have more practical experience about the implementations.

Moreover, now when the COVID-19 pandemic has further accelerated the adoption of the implementations, it is increasingly important to understand how these solutions are integrated into routine work [4]. Digital services are used for varying tasks and purposes, and creating a current overview of the experiences of professionals over a wide range of digital service implementations rather than focusing on 1 specific implementation would be of benefit. In addition, because Finland is the leading country for the third year in a row in digitalization according to the International Digital Economy and Society Index (I-DESI) [26], perceptions from Finnish professionals about the implementations can provide valuable information for many organizations that are further developing their digital services and systems.

Objectives

The aim of this study is to examine health and social care professionals' experiences of digital service implementations and to identify factors that support successful implementations and should be considered in the future to secure that the services are integrated into professionals' routine work. Normalization process theory (NPT) was used as an analytic framework [27]. This enables an understanding of how digital services can be normalized into professionals' routine work and workflow.

Methods

Design and Settings

A qualitative descriptive design with group interviews was used. The design was chosen because it allows information to be collected directly from those who are experiencing the phenomenon under investigation, as in this study from health and social care professionals [28]. We sought to examine health and social care professionals' experiences with successful implementations by asking them to share hindering and facilitating factors and what should be considered to achieve a successful implementation in routine work. This study followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines [29].

The interviews were conducted at 4 different health centers located in different parts of Finland. These health centers were selected because they were forerunners in digitalization as they had adopted new ways of working and operating digitally before and during the COVID-19 pandemic. Each of these health centers were either pilots or pioneers in the implementation of various digital services (eg, digital symptom questionnaires, self-management instructions, and remote health care

appointments). More examples of the level of each health center's digitalization and the services it provides can be found in Multimedia Appendix 1.

In Finland, health care services are divided into primary health care and specialized medical care. Municipalities (local governments) operate health centers, which represent citizens' first points of contact in public health care. Health centers provide a wide scope of primary health care services, such as general practice outpatient care, maternity and child health clinics, health promotion, oral health care, medical rehabilitation, home nursing, and laboratory and basic imaging services, as well as community hospital care. In some health centers, services may also include some specialized care, such as mental health and substance abuse services [30].

Participants

The participants were health and social care professionals (N=30) working in 4 health centers (Table 1). They were purposely selected by asking clinic managers to recruit volunteers. The inclusion criteria were that the participants had to be health and social care professionals who did client work at health centers that have implemented digital services into their work, and therefore they had recent experience with digital service implementations. Those professionals who had indicated their willingness to participate were contacted via email with information about the study and were asked their willingness to participate in the interviews. All participants provided written informed consent.

Table 1. Demographic characteristics of interviewed professionals (N=30).

Category and variables	Value, n (%)
User group	
Registered nurses	8 (27)
Public health nurses	5 (17)
Practical nurses	7 (23)
Physicians	5 (17)
Social workers	3 (10)
Social counselor	1 (3)
Digital counselor	1 (3)
Gender	
Male	3 (10)
Female	27 (90)
Age (years)	
<30	5 (17)
30-40	11 (36)
41-50	10 (33)
51-60	4 (14)
Career in this organization (years)[a]	
<1	1 (3)
1-5	15 (50)
5-10	3 (10)
10-20	5 (17)
≥20	3 (10)
Career in total (years)[a]	
<1	1 (3)
1-5	7 (23)
5-10	6 (20)
10-20	6 (20)
≥20	5 (17)

[a]Not all of the participants answered this question.

Data Collection

The data were collected with 8 semistructured focus group interviews. The focus group interview method is often used as a qualitative approach when the aim is to obtain data from a purposely selected group of individuals [31], for example, multiprofessional groups such as those in our study. We conducted 2 interviews in each organization. In each focus group, there were 4-6 participants from different professional groups, including physicians, registered nurses, public health nurses, practical nurses, social workers, social counselors, and digital counselors (Table 1). Five of the interviews were conducted face to face, but because the COVID-19 pandemic got worse in Finland, the rest of the interviews were conducted remotely using the Microsoft Teams application. The interviews were performed by 3 interviewers (authors JN, A-MK, and EL) from a research team with previous experience in conducting qualitative interview studies and experiences with digital service implementations.

The questions in the interview guide were based on the literature [11,15,17,18] and defined in collaboration with the research team (Multimedia Appendix 2). The interview guide included questions about the professionals' experiences with digital service implementations, such as which factors facilitated or hindered the implementations and what kind of suggestions the professionals had for future implementations to ensure that services integrate into routine work. Demographic questions related to age, gender, education, and working years in the current organization and total years of working.

The questions in the interview guide were tested in a pilot interview with 1 health care professional by using the Microsoft Teams application. In addition, participants in the first focus group were asked to rate the understandability and relevance of the questions. No changes were required to the interview guide, so the pilot interview was included in the study with the consent of the interviewees. With the permission of the participants, the interviews were recorded and then transcribed by a transcription company. The transcribed text was generated on 168 pages with a line spacing of 1.15, 11-point font, and the font style Verdana. The duration of the interviews ranged from 41 to 79 min, and the total duration of all the interviews was 501 min.

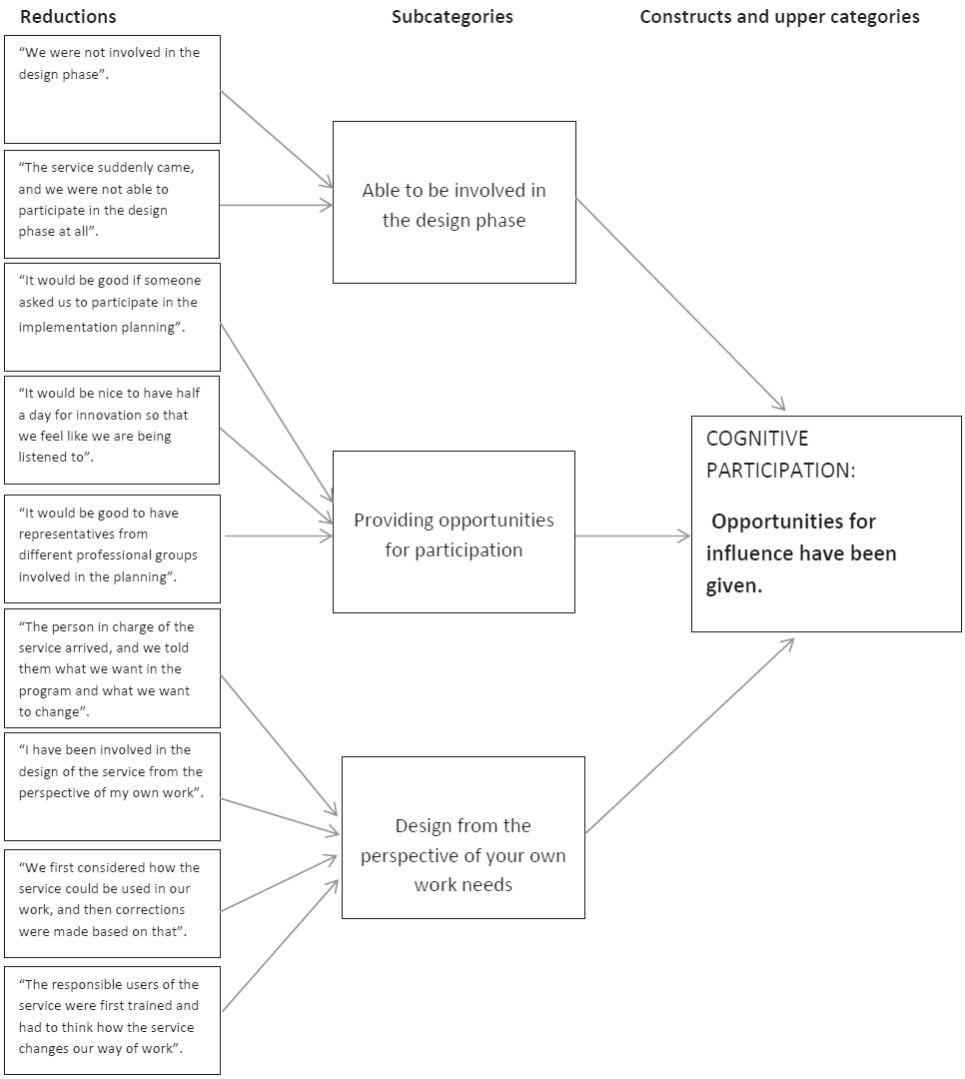
Data Analysis

We discussed the data saturation after the sixth focus group [32], recognizing that responses began to replicate one another and professionals had similar types of experiences with the implementation. The data were analyzed by using content analysis with an inductive-deductive approach [33]. First, 1 researcher (JN) read all the transcribed interviews a couple of times to form a preliminary image of the data. Then, all the expressions that responded to the aim of the study were extracted from the text and formed into codes (n=224) using ATLAS.ti software (ATLAS.ti Scientific Software Development GmbH). The codes were reductions of professionals' thoughts. Subcategories were then formed by grouping codes with similar content, which were then formed into upper categories. At this point, 2 other researchers (authors A-MK and SK) looked at the coding and the formed subcategories and upper categories, and discussions were held to reach an agreement on the content and names. The deductive method was then followed, in which the upper categories were divided into 4 different components according to the NPT framework (Figure 1).

We chose the NPT framework because it is a commonly used framework in implementation studies describing how new technologies and other complex interventions are normalized into routine work in health care settings [34]. It is an action theory, which means that it is concerned with explaining what people do rather than their attitudes or beliefs. Thus, it allowed us to understand the key actions that either promote or inhibit the implementation and integration of the services into professionals' routine work [35]. Moreover, we chose this theory for our study because it can be used to describe and judge the potential of the implementation, but it also has the ability to design and improve complex interventions [27]. We used all 4 of the NPT's components to obtain an overview of the implementations, contrary to previous studies, which mainly focused on just some of the components [36].

The first component (coherence) seeks to explain how the new service changes work and what are the aims and benefits of the service [27]. The second component (cognitive participation) focuses upon the work undertaken to engage people using the service and get them to buy into it [36]. The third component (collective action) refers to work that enables the implementation to happen [36]. It requires the organization to be supportive and people to have the necessary skills and training to perform the tasks associated with the digital services [27]. The fourth component (reflexive monitoring) includes questions such as whether people try to change the practice to fit their work, how they value the new digital services, and what effects the service has on peoples' work [27].

Figure 1. An example of the development of the content analysis process.



Ethics Statements

The Research Ethics Committee approval (THL/2304/6.02.01/2020) was applied for ethical support from the Finnish Institute for Health and Welfare. The data collected in the study were treated confidentially, and the results are reported in a way that does not identify an individual respondent.

Results

Major Findings

We identified 14 practices that, based on the experiences of the professionals, support successful implementation. A detailed description of how the different practices are distributed under the components of the NPT is given in Table 2. The quotation abbreviation meanings are as follows: I=interview and P=participant.

Table 2. Good practices when implementing digital services based on NPT[a] components (n=224).

NPT component and good practices[b]	Mentions[c], n (%)
Coherence (sense-making work): how professionals understand and make sense of the new service (n=38, 17%)	
Communication is comprehensive and continuous:	28 (13)
• The information is multichannel • The service presentation reaches everyone. • The service has been informed	
The implementation process is consistent:	7 (3)
• The implementation process needs to be clear • There is enough time to get ready for the implementation	
The use of the service is justified:	3 (1)
• The reasons for using the service are given	
Cognitive participation (relational work): how professionals engage and participate in the service (n=20, 9%)	
Opportunities for influence have been given:	15 (7)
• Professionals are able to be involved in the design phase • Professionals are provided opportunities for participation • The design is from the perspective of the professionals' own work needs	
The attitude toward the service is positive:	5 (2)
• Previous positive experiences toward eHealth implementations occur • Professionals show interest in the service • Professionals accept the need for the implementation	
Collective action (enacting work): the work that individuals (professionals) and organizations have to do to enact the new service (n=136, 60%)	
Support is provided from several fast and efficient sources:	39 (17)
• Support is given • The support model is clear • Support is close and easily accessible • Support is given by champions • Support is received from the work community itself • Faster/more efficient sources of support are needed	
Sufficient time is provided for familiarization with the service:	36 (16)
• Time is provided for familiarization with the service • Independent information retrieval and usage learning are required • The service must be learned alongside the work • A demo version is needed to practice before deployment	
Enough knowledge of the service is provided:	31 (14)
• Coworkers teach each other with sufficient skills • There are no shortcomings in basic technical skills • There is a need for nonstop training • Sufficient and clear information about the use of the service to support its use is provided • Training is systematically planned	
The training is targeted according to work tasks and competence:	18 (8)
• There is a need for a competence survey • Training is targeted according to professionals' work tasks • Training is targeted according to professionals' skill level/needs	
Various teaching methods are provided:	12 (5)
• Versatile teaching methods are available • Good and clear written instructions are provided • Video training is needed to support learning	
Reflexive monitoring (appraisal work): how professionals reflect on or appraise the effects of the services (n=30, 13%)	

NPT component and good practices[b]	Mentions[c], n (%)
The service is easy to use: • The assumed heavy usability of the program prevents successful deployment • Experiences with poor usability affect introducing new programs • The service is easy to use • The service has no functional weaknesses	12 (5)
Usage monitoring takes place: • There is continuity of deployment monitoring and evaluation	9 (4)
Giving feedback on the service is possible: • The feedback channel is known • Sending the feedback forward is smooth	5 (2)
The service supports work tasks: • The service is perceived as useful	4 (2)

[a]NPT: normalization process theory.

[b]The categories inside the NPT's components are sorted in the order in which the participants mentioned the most.

[c]How many times the participants mentioned this category.

Coherence: How Do Professionals Understand and Make Sense of the New Service?

The participants considered that the implementation should be prepared by *comprehensive and continuous communication*. They experienced that the communication had failed while announcing that information about the upcoming implementation happened unexpectedly and therefore the presentations had not reached everyone. For future implementations, participants suggested that the communication be done through different communication channels so that it reaches as many employees as possible and avoids uncertainties in the implementation of the service.

> *Implementation is considered successful when the communication is multichannel, which includes a video, a brochure, and a physical person to talk about the service.* [I7, P3]

According to the participants, for digital service implementation to be successful, *the implementation process must be consistent*. The implementation process needs to be clear, and the professionals should have enough time to get ready for the upcoming implementation. The participants had previous experiences with how implementations had taken place on a tight schedule, and thereby a lot of ambiguity had been associated with the process. Some of them had previous experiences where they were first told that the service was going to be implemented but later it was canceled and they attended unnecessary trainings. They started to lose their trust in future implementations and changes.

> *You will lose trust for any change when you experience unclear implementation experiences.* [I2, P1]

In addition, the participants also felt that it is important *to provide a good justification for using the service*. They felt that telling them why the service was implemented and why it needs to be used gave them the motivation to use it in their routine work. In addition, accepting the digitalization and understanding it as a mandatory way of working were contributing factors. Some of the participants even felt that the time is apt for digitalization and that they must simply go with the flow. They also considered it important that the benefits of using the digital service (from the perspective of their own work) were emphasized.

> *Implementation is enabled by the fact that the employee [themselves] perceive the service as useful and good in [their] own work.* [I3, P1]

Cognitive Participation: How Do Professionals Engage With and Participate in the Service?

The participants noted that in good implementation, champions who have an interest and additional training in the service should be involved in implementation from the beginning. They also highlighted that it is important to give everyone, not only the champions, *an opportunity to influence and participate* by giving insight for the service of one's own work needs. The participants suggested that implementation be facilitated by involving professionals from different professional groups in the design phase so that everyone would have a voice. In addition, the participants mentioned that it is important that they have been given the option to use working hours when participating in the design phase of digital services.

> *Usually, we have no time to innovate. It would be nice if there was, for example, half a day for development, which would give the staff a voice.* [I2, P3]

Ensuring that the professionals have a *positive attitude toward the service* enables successful implementation according to the participants. If the professionals had prejudices or negative attitudes toward the digital services, they were reluctant to use them. The participants expressed that usually these negative emotions were consequences of a lack of involvement in the design phase. Prejudices were also often related to the usability of the service. It was feared to be too difficult to use or the

professionals simply had bad experiences with previous implementations.

> *Prejudices can negatively affect successful implementation because you may have some perception or fear that the service [that] is being implemented is too difficult to use.* [I7, P3]

Collective Action: The Work That Professionals and Organizations Must Do to Enact the New Service

The participants pointed out that *support should be available from a variety of sources*. Lack of support or the support model being unclear was found to hinder successful implementation. They noted that everyone should know how the support is provided, whom to contact in the case of a problem, and where to find all the related contact information. The participants had 2 views on the source of support. Some believed that support required a person physically present who could be approached quickly in problem situations. Especially after the first weeks of implementation, this was considered important. For some, remote support was thought to be adequate, as this would allow support to remotely connect the user's computer, if necessary, thus quickly supporting the user in the event of a problem. Nevertheless, what was considered to be the most important thing was that the support should be close and readily available.

> *The person providing the support does not have to be physically present, but it would be good to have support remotely that is easily and quickly available so that [they] can remotely show how to do these things with the service.* [I8, P3]

In addition to the support provided by the organization, support was often received from one's own workplace, most often from one's own colleagues. Some of the participants had experiences of champions supporting the use of the service. In addition to receiving support from their own colleagues, some of the participants also received support from their own supervisors. However, only a few considered it to be important that the supervisors support employees in the implementation process. For them, the attitude of supervisors toward digital services was the more substantial contributing practice to successful implementation.

Most of the participants mentioned that there should be *enough time to get familiar with the service.* They experienced that they had not been provided enough time to get to know the service but had to learn to use it alongside their work while the patient was at the reception. They suggested that by having a demo version, they would get an opportunity to practice the service independently or with colleagues before using it with patients. It would also give them the chance to practice it in peace and when it suits them best. However, some of the participants saw that the use of the service would be learned over time while working or through mistakes at the latest.

> *When you fail enough times, you will get it right eventually. You will learn from your mistakes.* [I6, P3]

According to the participants, well-planned and scheduled training regarding the use of the service, as well as equal opportunities and time to participate in these training sessions, are important. The training should also be nonstop so that it would train as many employees as possible and even the shift workers could attend. The participants also pointed out that having *enough knowledge on how to use the service* is important for the success of the implementation. They believed that having enough knowledge would help them achieve confidence in using the service. The participants described problematic situations where the coworkers had taught other coworkers with insufficient knowledge. Furthermore, with such experiences, they mentioned that effective and clear information about the use of the service ensures that it is used correctly.

In addition, 1 of the key practices that the participants pointed out was that the service provider or the organization should *provide different training methods* for employees. One-sided training methods prevented successful implementation. For example, watching training videos alone did not guarantee sufficient skills to successfully use services. However, some of the participants experienced that video training enabled recounting whenever they needed it. In addition to various training methods, participants mentioned that it is important to have, especially after its implementation, written instructions on how to use the service.

The participants hoped that their skills could be assessed to map their training needs. Targeting training according to the level of competence would be useful, as some people may need to learn more basic technical skills, while others already master them well and may be able to cope with shorter training sessions. It was also mentioned that the individuals who embrace the program more easily, such as recent graduates, may find the video training enough and no other forms of training will be needed. The importance of targeting training according to the competence requirements set by the job tasks was also emphasized.

> *I would have wished for targeted training for my own professional group because now they have been general. It would be more efficient if the [training sessions] were more targeted, so you could focus on the things you need in your own work.* [I8, P2]

Reflexive Monitoring: How Do Professionals Reflect on or Appraise the Services' Effects?

The participants noted that after the implementation, it is important that the service be perceived to work well, because experiences of poor usability were believed to jeopardize successful implementation. Thus, the *service should be easy to use* and should not have usability vulnerabilities.

> *Usability and especially the ease of using the service plays a huge role if you want the implementation to be successful.* [I2, P1]

In addition, after the implementation of the service, *monitoring its use* was also considered important. This meant, for example, regular monitoring of the correct use of the system and the use of all included features. The participants were concerned about the misuse of the system due to a lack of sufficient training and monitoring of everyday use.

> *The problem is that no one comes back and asks if you have learned to use the service; a follow-up visit is needed.* [I7, P3]

The participants also pointed out the importance of getting an *opportunity to provide feedback* on the new service after the implementation and that the feedback be used to develop the service. It was essential for the functioning of the feedback channel that it be known by everyone and that the feedback process be perceived as smooth. If it was not perceived as being smooth, there was no desire to give feedback.

> *If you come up with a good idea, taking it forward was not made easy; if it takes a lot of time, it is often left undone.* [I2, P2]

According to the participants, the use of the digital services that are being implemented should be *useful for one's own work*. The service was not used nor recommended, for example, to patients if the participant considered the service unbeneficial for one's own work.

Discussion

Principal Results

This qualitative study identified factors that support successful digital service implementations and should be considered in the future to make sure that the services are integrated into health and social care professionals' routine work. According to professionals' implementation experiences and by using the NPT framework, we suggest 14 practices that should be considered when implementing new services into professionals' clinical work.

To get professionals to understand and make sense of the new service, (1) the communication related to the implementation should be comprehensive and continuous and (2) the implementation process should be consistent. (3) A justification for why the service is going to be implemented should also be given. The best way to engage professionals with the service is (4) to give them opportunities to influence and (5) to make sure that they have a positive attitude toward the upcoming service. To enact the new service into professionals' routine work, it is important that (6) the organization take a supportive approach by providing support from several easy and efficient sources. The professionals should also have (7) enough time to become familiar with the service and have (8) enough know-how about the service. The training should be (9) targeted individually according to skills and work tasks, and (10) it should be diverse. The impact of the implementation on the professionals' work should be evaluated. The service (11) should be easy to use, and (12) usage monitoring should happen. An opportunity (13) to give feedback on the service should also be offered. Moreover, (14) the service should support professionals' work tasks.

Comparison With Prior Work

According to our study, to ensure that the service makes sense (the NPT's component coherence) for the users, the communication related to the implementation should be comprehensive and continuous. In earlier studies, the importance of good information has been highlighted when implementing digital services [14,17,18,37]. However, previous studies do not mention specifically what kind of good communication would best support professionals in their work. In our study, the professionals suggested that the communication should happen from a variety of different channels so that it reaches everyone, including shift workers. Our results highlight that when the implementation process happens under a tight schedule, such as during the COVID-19 pandemic, the importance of comprehensive and continuous communication increases.

In our study, the professionals also highlighted that it is important to justify why the service is going to be implemented in order to ensure that it makes sense for the users. The benefits of using the service seemed to be especially important from the perspective of the professionals' own work. Sanders et al [38] presented in their study that usually the difficulty in implementations is a failure to clarify coherence to the users. If the professionals fail to understand the way of working as helpful and relevant, they may be unwilling to use it. In addition, May et al [37] highlight the importance of coherence; if there is a desire for the service to be normalized into the professionals' work, it is important that the service make sense for the users [27,36]. In the review by Mair et al [19], the sense making was not highlighted as being that important when implementing eHealth systems. However, it is good to note that this review was conducted 10 years ago.

Some earlier studies have pointed out that involvement is 1 of the key contributing factors when implementing new digital services [17-19]. In addition, the NPT [27,36] highlights the importance of engagement and participation (cognitive participation component) with the service to get it normalized into routine work. In our results, the professionals underlined the importance of everyone getting an opportunity to influence and participate in designing the service. Our results therefore support previous results; however, the main problem according to our results is that time for involvement is not given to professionals. The heavy workload and the lack of staffing of health and social care settings have increased in recent years, which may influence the time given for innovation and design [39].

According to our results, to make sure the enactment of the work happens (collective action component), the support should be provided from a variety of fast sources. However, it was interesting that the professionals did not highlight the importance of supervisors' support, whereas previous studies have recognized the lack of support from supervisors as 1 of the major barriers to implementation [17,18,40]. However, we found that the positive attitude toward the service is more important. In addition, enactment of the work happens if people have the necessary skills and training to perform the tasks associated with the services. In our study, it was important for the professionals to have enough knowledge about the service and time for its familiarization. In previous studies, the lack of time [11,18] and the lack of information [18,19] were also experienced as inhibiting factors.

In our study, it was important to use various teaching methods and training, which was targeted according to work tasks.

Professionals also suggested to target the training according to the competence assessment. Previously, the training and competence of professionals have been found to be key factors when implementing new digital services [11,18,19], but competence assessments have received less attention. Mair et al [19] mentioned the importance of training, but they did not specify what kind of training would be required. Therefore, more information is needed in the future about what, how, and how much training should be provided.

In our study, it seems that the evaluation of a new digital service depends on how well the service supports professionals' work tasks and whether users perceive the service use usable (reflexive monitoring). Our results suggest that follow-ups are important, because after the implementation, the users expected someone to monitor whether they were using the services in an appropriate manner. Gagnon et al [17] also found that monitoring the use of the system should happen at the early stages of implementation to ensure immediate response to users' feedback [17]. It is important that the organizations and service providers keep on engaging with the service users after the implementation has taken place. This also provides an opportunity to ensure that the service is used correctly. In addition, in our study, being able to give feedback about the service was considered important because it gave the users the feeling that they can influence. This also gives the organizations and service providers an opportunity to further develop the service based on the users' needs.

The NPT framework seemed to be a suitable choice for our research because our findings were well interpreted with the components of this framework. The NPT offered us a useful tool for organizing the important practices involved in the data, which enabled the development of recommendations for future implementations. We had difficulties sometimes in understanding and applying coding to some of the NPT components, especially coherence and cognitive participation, which are more related to time before implementation. However, even when we used all 4 components, collective action frequently got many mentions, maybe because it describes the enactment of the work most comprehensively. May et al [37] suggested that for future studies, it is important to connect collective action much more closely to the context in implementation studies.

Strengths and Limitations

The strengths of this study include multilevel information about experiences from different professional groups when implementing a different kind of new digital service in the era of the COVID-19 pandemic. The fact that a fairly large number of interviewees (n=30) took part can also be considered a strength. Our results are from the forerunner country in digitalization and from 4 different health centers that are pioneers in digitalization and located in different parts of Finland. Thus, we were able to obtain important information from pioneer organizations for many organizations that are further developing their digital services and systems. A qualitative research method was able to give us a more in-depth overall picture of the situation during the era of COVID-19.

Credibility was established in this qualitative study by following the criteria of reliability presented by Lincoln and Cuba [41]. To establish confidence that the results were true, we collected data generated by 3 interviewers, 1 of whom was a more experienced interviewer. In the Results section, we used quotations to make sure the results were authentic. Credibility and interrater reliability were increased by having several sessions of peer debriefing with the research team about the interviews, the analyses process, and the name of the codes. Dependability was guaranteed by describing the study methods, data collection process, and analysis process as thoroughly as possible. Confirmability was guaranteed by collecting data from different groups of professionals, who were performing different kinds of tasks in a health and social care setting. Transferability was guaranteed by purposely sampling different kinds of professionals to participate in the focus group interviews.

This study had some limitations. One limitation was that because the COVID-19 epidemic got worse during data gathering, we had to conduct some of the interviews using the Microsoft Teams application instead of face-to-face interviews. The focus group interviews' aim is to get people to talk in a group, and with Microsoft Teams, it was more difficult and required more effort from the interviewers. However, fortunately, our interviewers were experienced and were able to plan a strategy for promoting discussion. Interrater reliability was also 1 limitation, because if we had performed the coding by double-coding it, we could have compared the unity of the coders more closely instead of only discussing it [42]. One more of the limitations was that the interviews were conducted in Finnish health centers; compared to other countries, Finland is ahead in digitalization and it can therefore influence implementation attitudes and experiences. So, transferability to other countries must be done with caution, especially related to countries with a low level of digitalization. The interviews were conducted in health centers, where there can be certain types of digital services in use, and therefore the results may not be transferable to other health care contexts. However, a previous review (eg, Mair et al [19]) showed corresponding results even when the environment varied. In addition, given that these 4 health centers were purposely selected because they were advanced in digitalization, it may have also influenced the results. Finally, 1 of the limitations was that most of the professionals who attended the interviews were from the health care sector, and therefore future studies about social care professionals' experiences with digital service implementations should be conducted.

Conclusion

In this study, we examined health and social care professionals' experiences with digital service implementations and identified factors that support successful implementations and should be considered in the future to ensure that the services are integrated into professionals' routine work. Based on the results, we suggested 14 practices for organizations to consider when implementing new digital services. Due to practical reasons, such as limited time and resources and a high number of implementations in organizations, it may not be realistic to expect all the practices to be fully executed. However, these practices can guide organizations to find appropriate ways to

support professionals and help organizations to pursue successful implementations. Our findings can be useful for countries that are beginning their service digitalization or further developing their digital services. For future studies, it is essential to examine implementations in a different phase of the process. The digital services add workload on already busy schedules [17], and thus, it would be beneficial to study how the implementations influence professionals' well-being at work.

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Authors' Contributions

JN contributed to conceptualization, methodology, formal analysis, writing (original draft, review and editing), and visualization; A-MK was responsible for conceptualization, methodology, formal analysis, writing (review and editing), and visualization; SK contributed to conceptualization, methodology, formal analysis, and writing (review and editing); EL aided in formal analysis and writing (review and editing); PH, JK, and IK contributed to writing (review and editing); TH aided in conceptualization, writing (review and editing), and supervision.

Conflicts of Interest

None declared.

Multimedia Appendix 1

Description of the level of digitalization in studied health centers.
[DOCX File , 26 KB-Multimedia Appendix 1]

Multimedia Appendix 2

Interview guide.
[DOCX File , 26 KB-Multimedia Appendix 2]

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Abbreviations

COREQ: Consolidated Criteria for Reporting Qualitative Research
I-DESI: International Digital Economy and Society Index
NPT: normalization process theory
WHO: World Health Organization

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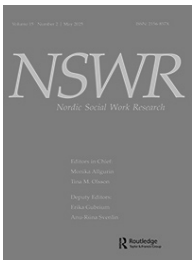

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The association of client information system implementation with the well-being of Finnish social welfare professionals: a cross-sectional study

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ABSTRACT

Digitalization and implementations of information systems have transformed social work, impacting the well-being of social welfare professionals. Previous studies have emphasized that implementations may increase stress, particularly if professionals are not involved in the development work. We examined how different phases of client information system implementation are associated with and interact with participation in information system development and satisfaction with software providers' development work, particularly in relation to stress related to information systems and psychological distress. The implementation phases were divided into 1) within past 6 months, 2) within 12 months, 3) forthcoming within the next 12 months and 4) no past or forthcoming implementations within 12 months. A total of 990 Finnish social welfare professionals responded to the online survey in 2020. The data were analysed using analysis of covariance (ANCOVA). The analyses were adjusted for age, gender, working environment and time pressure. The results showed that social welfare professionals who recently experienced implementation had more stress related to information systems. Those professionals who were dissatisfied with software providers' development work experienced more stress related to information systems and psychological distress. Participation in the system development during the recent implementation was associated with increased stress related to information systems. Recent implementation was associated with higher psychological distress among those who were dissatisfied with software providers' development work. Organizations should support social welfare professionals' well-being after recent implementations by ensuring adequate support, time, training, and resources for development work, and fostering smooth cooperation between professionals and software providers.

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Implementation; client information system; digitalization; social welfare professional; stress related to information systems

Introduction

During the digital transformation, technologies such as client information systems (CISs) have merged into social work, significantly changing the work of social welfare professionals (SWPs). Client Information Systems (CISs) are digital tools used in social work to manage client data and

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case information, aiming to improve operational efficiency and service delivery in social work (Barfoed 2019; Breit et al. 2021; Gillingham 2016). These changes have caused social work to shift from relationship-oriented approach towards performance-oriented work, aligning more with bureaucratic demands (Parton 2009). However, this shift has created a conflict in SWPs' work, challenging their perceived ability to act in accordance with the client's interests and social work values, often leading to stress and potential burnout (Mänttäri-van der Kuip 2020).

While CISs offer many opportunities for SWPs, such as improved efficiency and better tools for observing the client's situation (Lavié and Fernandez 2018; Zhu and Andersen 2021), there are ongoing concerns about the failure of CIS implementations (Gillingham 2019). The main criticisms of CIS implementations are that they are outdated, clumsy to use, unsuitable of social work practice, time-consuming, and even a source of stress for professionals (Breit et al. 2021; Khanchel-Lakhoua and Kadri 2024; Lavié and Fernandez 2018). Moreover, a successful CIS implementation requires careful planning, as too many simultaneous changes can hinder success (Gillingham 2018; Weiner et al., 2019). When properly executed, CIS implementation can enhance user satisfaction, but failures often result from misunderstanding professionals' needs and workflows (Gillingham 2015, Nadav et al. 2021). Despite high level of investments, CIS may complicate work, as they are often designed with administrative rather than frontline workers need in mind (Burton & van den Broek, 2009).

User involvement in the implementation of CIS is crucial for ensuring that these systems meet the practical needs of professionals and are effectively integrated into their workflows (Gillingham 2016). Involving SWPs early in the design process, for example, through workshops, pilot testing, and focus groups allow the system to reflect the everyday demands of social work, improving both functionality and user satisfaction (Khanchel-Lakhoua and Kadri 2024). Moreover, recent studies show that when professionals have a say in the development, they experience lower stress levels and greater ease of use, which reduces resistance to adoption (Khanchel-Lakhoua and Kadri 2024, Nadav et al. 2021). Additionally, organizational support in terms of training and collaborative development has been found to be critical for enhancing the effectiveness of CIS systems. Therefore, ensuring user participation not only improves system adoption but also helps mitigate issues like increased workload and stress, which are commonly associated with poorly implemented systems (Barfoed 2019; Khanchel-Lakhoua and Kadri 2024; Martikainen et al. 2021).

Poorly functioning or constantly changing information systems have been identified as significant psychosocial factors contributing to work-related stress, particularly among healthcare professionals in Finland (Heponiemi et al., 2019; Kaihlanen et al. 2020). This study examines the well-being of SWPs through two key indicators: psychological distress and stress related to information systems (SRIS), which have previously been used to assess well-being in Finnish nurses and physicians (Heponiemi et al. 2018, 2021; Urnberg et al. 2022). SRIS refers to the stress caused by poorly or constantly changing systems (Hyppönen et al. 2019), while psychological distress stems from broader workplace demands and stressors that can adversely affect mental and physical health (Ridner, 2004).

Although some research has been conducted in the social-work field, much of it has focused on the concept of technostress, focusing on how digital tools can contribute to stress among social workers (Nordesjö & Scaramuzzino, 2023; Scaramuzzino & Martinell Barfoed, 2023). Despite these contributions, there remains a significant gap in understanding how the implementation of CIS specifically impacts SWPs well-being, particularly when they are actively involved in the development of these systems. Therefore, we performed a quantitative examination of the associations of the CIS implementation phase, participation in the CIS development and satisfaction with software providers' development work with stress related to information systems (SRIS) and psychological distress among Finnish social welfare professionals. Moreover, we examined the interactions of the implementation phase with a) participation in the CIS development and b) satisfaction with software providers' development work for SRIS and psychological distress.

The specific research questions were:

RQ1. Are CIS implementation phase, participation in the CIS development and satisfaction with software providers' development work associated with SRIS and psychological distress?

RQ2. Are there interaction effects on the implementation phase with participation in the CIS development and satisfaction with software providers' development work for SRIS and psychological distress?

Methodology

Study context

During the data collection, local authorities (municipalities) were responsible for organizing and financing social services in Finland. Social services were provided by public, private and third-sector organizations. However, in 2023, regions (well-being services counties) took responsibility for organizing both health and social services in Finland (*The Social Welfare Act. [1301] 2014*, n.d.). The well-being services counties are responsible for organizing for their residents primary care, secondary health care, social and rescue services (European Observatory on Health Systems and Policies et al. 2023. Licenced social welfare professionals include social workers, social service professionals, professionals of applied gerontology and rehabilitation counsellors. They are either licenced with university-level master's degrees or with bachelor's degrees from universities of applied sciences (National Supervisory Authority for Welfare and Health 2016). Mostly, the work of these professionals focuses on the assessment and monitoring of the needs of social service clients and the coordination, decision-making and delivery of social services (Ministry of Social Affairs and Health 2019). In this study, we are interested in highly educated professionals because the use of CISs is often central to the diverse nature of their work.

In Finland, CISs have become a principal source of client information in social welfare practice. CISs are essential tools for managing information about client cases, and therefore, they play an important role in SWPs' everyday work (Salovaara, Hautala, and Silén 2022). The Finnish Ministry of Social Affairs and Health regularly commissions national surveys on information systems to monitor the current state and trends in digitalization of social services in Finland to gather evidence for use in future development (Vehko, Ruotsalainen, and Hyppönen 2018).

Participants and data collection

The data for this study were collected through an online survey in September–October 2020 from social welfare professionals with at least a bachelor's degree. To reach social welfare professionals from the various social welfare organizations, the data was collected in co-operation with trade unions; the Union of Professional Social Workers (Talentia), the Trade Union for the Public and Welfare Sectors (JHL) and Social Science Professionals (YKA). These unions sent an invitation and a survey link to the working-age social welfare graduates (n = 12,471) obtained from the membership registers of the indicated trade unions. Before the survey went for distribution, it was piloted for the first round by seven experts and for the second round by six of these same experts (Salovaara, Hautala, and Silén 2022). During the data collection, the survey did not reach everyone due to incomplete contact information and the invitation to the survey was also distributed via social media to the social-sector networks and competence centre on social welfare (Salovaara, Silén, and Hautala 2022). Altogether, 990 SWPs responded to the questionnaire (response rate approximately 8%).

Ethical considerations

The survey received ethical approval from the ethical committee of the Finnish Institute for Health and Welfare (THL/482/6.02.01/2020). Participation in the online survey was voluntary. The unions did not disclose members' personal information to the researchers. The study was conducted in accordance with good scientific practice (Finnish Advisory Board on Research Integrity 2012).

Measures

Dependent variables

Stress related to information systems (SRIS) was measured with two items asking how often 1) changing information systems or 2) difficult or poorly functioning systems, have disturbed, worried, or burdened participants' work over the past 6 months. The items were rated on a 5-point Likert response format and the options ranged from 1 = 'very rarely' to 5 = 'very often or continuously'. The items were combined into a mean sum variable and the scale's reliability (internal consistency) was tested with Cronbach's alpha. Internal consistency tests how consistent a test or measurement is and whether the items are measuring the concept they are supposed to be measuring (Adamson and Prion 2013; Tang, Cui, and Babenko 2014). Cronbach alpha correlates each scale score with the total score and then compares it to the variance for all individual item scores. For SRIS, the alpha score was ($\alpha = 0.63$), and alpha scores between 0.6 and 0.7 can be seen indicating an acceptable level of reliability (Hulin et al. 2001; Loewenthal and Lewis 2018). Furthermore, the mean sum variable can be treated as an interval-level measurement and thus used as continuous variable (Boone and Boone, 2012). The higher mean scores indicated higher SRIS. This measure was developed in Finland, and it has been successfully used to examine the well-being of health care professionals (Heponiemi et al. 2018, 2019, 2021; Kaihlanen et al. 2020; Urnberg et al. 2022). It has been found to be associated, for example, with time pressure, cognitive workload and high levels of technical problems of the IS among physicians and nurses (Heponiemi et al. 2018, 2019, 2021; Kaihlanen et al. 2020; Urnberg et al. 2022).

Psychological distress was measured with four items ($\alpha = 0.85$) from the widely used General Health Questionnaire-12 (GHQ-12) (Goldberg et al. 1997). These four items represent anxiety/depression factor from the Graetz's three-factor structure which has been suggested to be the most preferable factor model for GHQ-12 (Graetz 1991). Participants were asked to describe their well-being for the past week. The participants were asked 1) whether they have had difficulty sleeping because of worries, 2) whether they have felt unhappy and depressed, 3) whether they have felt constantly overworked, and 4) whether they have felt that they are not coping with the difficulties they are facing. The response options were 1 = 'never', 2 = 'not more than usually', 3 = 'somewhat or more than usually', and 4 = 'much more than usually'. The mean was calculated, and the higher score indicated higher distress. Several different scoring methods for CHG-12 have been used, and we decided to use the Likert-type scoring method (1-2-3-4) so that we were able to use continuous variable and our results would be comparable to several other studies that have used this method with other health and social care professions in Finnish context (Aalto et al. 2018; Heponiemi et al. 2014; Penninkilampi-Kerola, Miettunen, and Ebeling 2006). The use of continuous variable enabled us to get more variation because we were interested in general psychological distress levels (not pathology) in the basically healthy working-aged SWP population.

Independent variables

CIS implementation phase was assessed with a question asking whether the participant's work unit had recently implemented or was planning to implement a new CIS. The participants had four options to choose from 1) 'yes, within past 6 months', 2) 'yes, within 12 months', 3) 'no, but forthcoming within the next 12 months' and 4) 'no past or forthcoming implementations within 12 months. This measure has been validated and used in

previous studies, for example, to examine its association with stress related to information systems (SRIS), time pressure, and cognitive failures among Finnish registered nurses (Heponiemi et al. 2021).

Participation in CIS development was evaluated by asking whether participants were involved in IS development activities. The response options were 1) 'yes, I have certain time for the development work', 2) 'yes, during my own work' and 3) 'no'. For analysis purposes, these responses were dichotomized into two categories: 1 = 'yes' (including options 1 and 2), and 2 = 'no' (option 3).

Satisfaction with software providers' development work was measured using three statements from the validated National Usability-Focused Health Information System (NuHIS) Scale (Hyppönen et al. 2019). The participants were asked to rate their agreement with the following statements: 1) The system vendor is interested in the feedback provided by the users, 2) the system vendor implements the correction and proposed changes as desired, and 3) the correction and modification proposals are implemented with sufficient urgency. The response options ranged from 1 = 'strongly disagree' to 5 = 'strongly agree'. The three items were combined to a mean sum variable ($\alpha = 0.84$), with a higher score indicating more satisfaction with software provider's development work.

Background variables

Time pressure was measured by asking participants 1) how often constant rush and pressure of unfinished work and 2) too little time to do the job properly had disturbed, worried, or burdened them at work in the last 6 months. The response options ranged from 1 = 'very rarely' – to 5 = 'very often or continuously'. The mean was calculated ($\alpha = 0.91$), and higher scores indicated higher time pressure. This measure has been widely used previously (Elovainio and Kivimäki 1998; Heponiemi et al. 2015; Vehko et al. 2019). Participants' gender (1 = female, 2 = male, 3 = other), age (1 = <35, 2 = 35–44, 3 = 45–54 and 4 = >54 years) and working environment (1 = non-institutional services, 2 = emergency social services, 3 = institutional services, 4 = health services and 5 = other) were also asked for in the survey.

Statistical analysis

The analyses of covariance (ANCOVA) were conducted with implementation phase, participation in CIS development and satisfaction with software providers' development work as independent variable and SRIS and psychological distress (in separate analyses) as dependent variables. This method was chosen because it is a suitable method when dependent variable is continuous and independent variables are both continuous and categorical (Miller and Chapman 2001). Before the actual analysis, multi-collinearity was examined using VIF values (Variance Inflation Factor). VIF values for all variables were between 1.0 and 1.02, indicating that multicollinearity was not a problem (Shrestha 2020). The analyses were adjusted for age, gender, working environment and time pressure because, in previous studies, these factors have played an important role in professionals' well-being (Blomberg et al. 2015; Gómez-García, Bayón-Calvo, and Lucas-García 2021; Heponiemi et al. 2021). In addition, we examined the potential interactions of the implementation phase with a) participation in the CIS development and b) satisfaction with software providers' development work for SRIS and psychological distress adjusted for main effects and above-mentioned adjustment variables. For the interaction analyses, continuous variables were centred to reduce possible multicollinearity as suggested by Nick & Campbell (Nick and Campbell 2007). Additionally, for the purpose of illustrating the significant interaction in the figures, the continuous variable 'satisfaction with software providers' development work' was categorized by using the median split. The analyses were conducted using the SPSS 27 statistical package.

Results

Characteristics of participants

The participants' characteristics are presented in Table 1. Over one-fifth of all participants had had CIS implementation within the preceding 12 months. One-third of the participants had participated in the development of the CIS.

The association of CIS implementation phase, participation in CIS development work and satisfaction with software providers' development work with SRIS

Table 2 shows the results of ANCOVA regarding research question 1 which was related to the main associations of independent variables with SRIS. Table 3 illustrates significant findings by showing estimated means of SRIS in different groups.

The CIS implementation phase, satisfaction with software providers' development work, time pressure, age and working environment were all significantly associated with SRIS (Table 2). Participants who experienced a CIS implementation within the past 6 months reported the highest levels of SRIS (adjusted mean 3.72, SE 0.11), whereas those with no forthcoming CIS implementation within the next 12 months had the lowest SRIS levels (adjusted mean 2.99, SE 0.08) (Table 3). Additionally, low satisfaction with software providers' development work and high time pressure were associated with high SRIS. Age and working environment also played significant roles in influencing SRIS levels. Participants aged over 54 and those working in emergency social services reported the highest levels of SRIS.

Table 1. The characteristic of the participants ($N = 990$).

Gender, n (%)	
Women	910 (91.9)
Men	54 (5.5)
Other	26 (2.6)
Age, n (%)	
Under 35	185 (18.7)
35–44	346 (34.9)
45–54	260 (26.3)
Over 54	199 (20.1)
Working environment, n (%)	
Non-institutional services	649 (65.6)
Emergency social services	47 (4.7)
Institutional services	152 (15.4)
Health services	77 (7.8)
Other	65 (6.5)
CIS implementation phase, n (%)	
Yes, within past 6 months	91 (9.2)
Yes, within past 12 months	132 (13.3)
No, but forthcoming within next 12 months	266 (26.9)
No, past or forthcoming implementations within 12 months	501 (50.6)
Participation in CIS development, n (%)	
Yes	324 (32.8)
No	664 (67.2)
Satisfaction with software providers' development work, Mean (SD)[a]	3.29 (0.86)
Time pressure, Mean (SD)[a]	3.65 (1.05)
Stress related to information systems, Mean (SD)[a]	3.06 (0.97)
Psychological distress, Mean (SD)[b]	2.91 (0.71)

a = range 1–5
b = range 1–4

Table 2. The association of independent variables with SWP's SRIS.

Variables	F[a]	P-value
CIS implementation phase	23.80	**<0.001**
Participation in CIS development	0.21	0.648
Satisfaction for software providers' development work	55.48	**<0.001**
Time pressure	112.76	**<0.001**
Gender	0.69	0.502
Age	15.15	**<0.001**
Working environment	4.29	**0.002**
R^2	0.278	

[a]F value defines whether the variability between group means is larger than the variability of the observations within the groups. To reject the null hypothesis that the group means are equal, a high F-value is needed (Miller and Chapman 2001).

Table 3. Estimated means[a] (EM) and standard errors[a] (SE) of stress related to information systems and psychological distress according to implementation phase, age and working environment.[b]

	SRIS		Distress	
	EM	SE	EM	SE
CIS Implementation phase				
Within the past 6 months	3.72	0.11	2.12	0.09
Within the past 12 months	3.41	0.10	2.17	0.08
Forthcoming within the next 12 months	3.09	0.09	2.10	0.07
No implementations	2.99	0.08	2.16	0.06
Age				
Under 35	3.17	0.10	2.20	0.07
35–44	3.11	0.09	2.02	0.06
45–54	3.33	0.09	2.11	0.07
Over 54	3.60	0.09	2.14	0.07
Working environment				
Non-institutional services	3.36	0.07	2.11	0.06
Emergency social services	3.64	0.14	2.01	0.11
Institutional services	3.18	0.10	2.24	0.07
Health services	3.26	0.12	2.01	0.09
Other	3.08	0.13	2.20	0.10

[a]Adjusted for CIS implantation phase, participation in IS development, satisfaction with software providers' development work, time pressure, gender, age and working environment.
[b]Means and standard errors are presented only to those variables that had a significant association with a dependent variable.

The associations of independent variables with SWP's psychological distress

Table 4 shows the results of ANCOVA regarding research question 1 which was related to the main associations of independent variables with psychological distress. Table 3 illustrates significant findings by showing estimated means of psychological distress in different groups.

Table 4. The association of independent variables with SWP's psychological distress.

Variables	F[a]	P-value
CIS implementation phase	0.50	0.683
Participation in CIS development	0.04	0.844
Satisfaction with software providers' development work	24.12	**<0.001**
Time pressure	187.13	**<0.001**
Gender	0.37	0.692
Age	3.57	**0.014**
Working environment	2.47	**0.043**
R^2	0.204	

[a]F value defines whether the variability between group means is larger than the variability of the observations within the groups. To reject the null hypothesis that the group means are equal, a high F-value is needed (Miller and Chapman 2001).

Satisfaction with software providers' development work, time pressure, age and working environment were significantly associated with participants' psychological distress (Table 4). As shown in Table 4, low levels of satisfaction with software providers' development work and high time pressure were associated with high levels of psychological distress. Participants who were under 35 years of age had the highest level of psychological distress (adjusted mean 2.20, SE 0.07) and the lowest level of psychological distress (adjusted mean 2.02, SE 0.06) experienced participants aged 35–44 years (Table 3). Moreover, those working in institutional services reported the highest levels of psychological distress (adjusted mean 2.24, SE 0.07), whereas those working in health services and emergency social services reported the lowest levels of psychological distress.

Interaction of CIS implementation phase with participation in the CIS development and satisfaction with software providers' development work

Figures 1 and 2 shows the results of ANCOVA regarding research question 2 which was related to interaction effects of CIS implementation phase with participation in the CIS

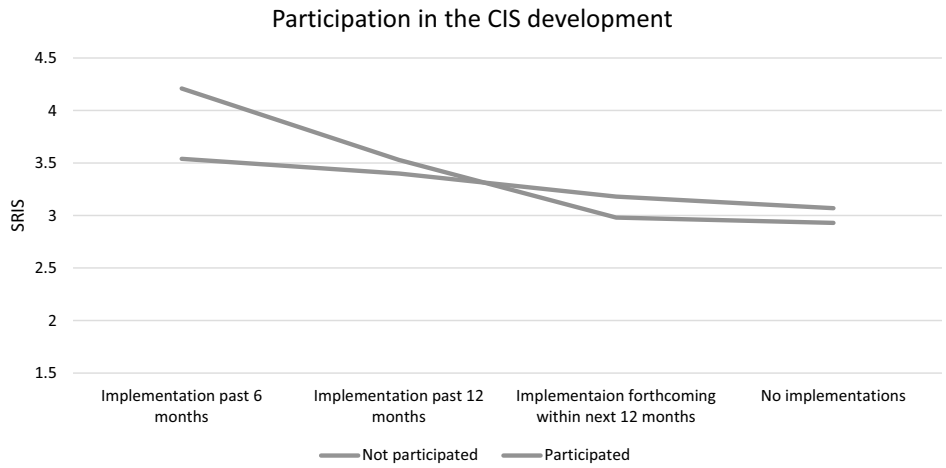

Figure 1. Interaction between implementation phase and participation in the CIS development for SRIS.

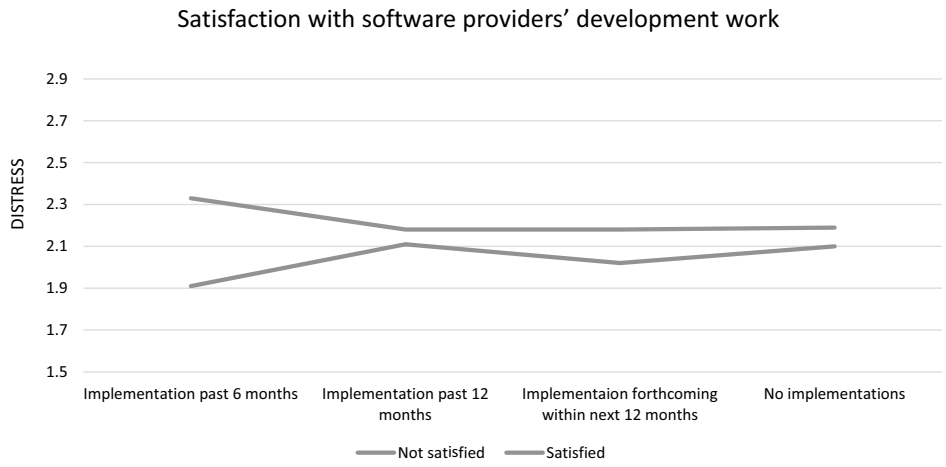

Figure 2. Interaction between implementation phase and satisfaction with software providers' development work for SRIS.

development and satisfaction with software providers' development work with SRIS and psychological distress.

The interaction between the CIS implementation phase and participation in the CIS development was found to be significant for SRIS ($F = 5.50$, $p < 0.001$). As illustrated in Figure 1, the highest SRIS levels were observed among participants who had both recently participated in system development and experienced a recent implementation phase. In contrast, the interaction between the CIS implementation phase and satisfaction with software providers' development work was not statistically significant for SRIS ($F = 0.02$, $p = 0.996$).

The interaction between the CIS implementation phase and satisfaction with software providers' development work was significant for psychological distress ($F = 2.74$, $p = 0.044$). Figure 2 shows that psychological distress levels were highest among participants who reported dissatisfaction with software providers' development work and experienced a recent CIS implementation. Instead, the interaction between the CIS implementation phase and participation in CIS development was not statistically significant for psychological distress ($F = 0.26$, $p = 0.855$).

Discussion

This study examined how CIS implementation phase, participation in CIS development work and satisfaction with vendor's development work were associated with SWPs' stress related to information systems and psychological distress. Our findings reveal that SWPs who experienced CIS implementation within the last 6 months reported significantly higher SRIS compared to those without recent implementations, aligning with research in healthcare context (Heponiemi et al. 2021). Although the recent implementation was associated with higher levels of SRIS among SWPs, it did not appear to reflect on psychological distress in our study, a positive outcome considering SWPs' known vulnerabilities to burnout and stress (Sánchez-Moreno et al. 2015). The high SRIS could be due to SWPs struggling with CIS, which doesn't effectively support their work, takes up too much time, or causes stress (Breit et al. 2021; Lavié and Fernandez 2018; Seniutis et al. 2021).

We found that the SWPs who had recently experienced CIS implementation and had participated in the IS development work had high levels of SRIS. Although user participation is generally seen as beneficial for improving system adoption (Lagsten and Andersson 2018; Nadav et al. 2021; Salovaara and Ylönen 2021), participation during stressful implementation periods might worsen the workload if not supported by adequate time and resources. This observation aligns with earlier findings, where high involvement during system changes can increase stress unless properly managed (Heponiemi et al. 2021; Khanchel-Lakhoua and Kadri 2024).

Furthermore, our findings indicate that satisfaction with vendor's development work plays a crucial role in SWPs well-being. Those who expressed dissatisfaction with vendor development work reported both higher SRIS and psychological distress, which supports existing literature that highlights the importance of vendor feedback processes in system implementations (Khanchel-Lakhoua and Kadri 2024; Martikainen et al. 2021Nadav et al. 2021). A particularly high level of psychological distress was found among SWPs dissatisfied with vendors development work and who had recently undergone CIS implementation. This suggests that immediate post-implementation modifications are essential, and without proper communication and timely updates from vendors, stress levels can increase (Lagsten and Andersson 2018; Martikainen et al. 2021Nadav et al. 2021).

Implications

Our study contributes valuable information on a phenomenon that has been less studied in the social welfare field. SWPs do crucial work for society and to enable SWPs successful encounters with clients; workers' well-being at work must be ensured. Our results provide important practical

significance by suggesting that more attention should be paid to the stress levels of SWPs during the first 6 months after implementing new CISs. It is important to involve professionals in development work, but it should be ensured that the well-being of those involved in the CIS development work have special attention paid to them. This could be ensured, for example, by managers, by supporting and giving SWPs sufficient time for development work (Kujala et al. 2020). Work allocation should also be conducted and allowed for professionals, so that they have the possibility to participate in the development work without any stressors. Too many changes at the same time must also be avoided (Gillingham 2018).

It has been suggested that CISs have not been developed from the perspective of SWPs, but rather from an administrative perspective (Gillingham 2015), as vendors may add more value to administrators' views because they are seen as the buyers of the systems (Shaha et al. 2015). It should be ensured that professional views are considered when developing the CISs to make it relevant for practice. Martikainen et al. (Martikainen et al. 2021) has suggested in their study that informaticists should be used to help interpret SWPs needs to IS vendors. This could perhaps help vendors to react to SWPs' feedback in an appropriate manner. Additionally, the reform of SWP curricula has been proposed to support the maintenance of adequate digital competence of SWPs (McInroy 2021; Seniutis et al. 2021; Taylor 2017). Additionally, more attention should be paid to the software providers' actions after implementation. Software providers' feedback system must be valid, meaning that professionals should know how to provide feedback to vendors and vendors should respond to the feedback by making the requested changes (Martikainen et al. 2021, Nadav et al. 2021).

It is extremely important to keep in mind that CIS implementations in social welfare work need to be approached with caution, especially in light of the complex, often stressful, nature of the work (Blomberg et al. 2015; Raudeliunaite and Volff 2020). As digitalization continues to evolve within this sector, addressing the psychosocial risks associated with CIS can enhance SWPs' well-being and reduce the negative impacts of technological change (Eurofound 2020; Parton 2009).

Study limitations

This study had some limitations which need to be considered when interpreting the findings. Although, the response rate (8%) and the number of the respondents was relatively small (990), respondents formed sufficient material for the study's purposes. However, the comprehensiveness and representativeness of the data should be carefully considered.

One important limitation is the cross-sectional nature of the study, which prevents establishing causal relationships between the variables. A longitudinal design would provide a more comprehensive understanding of how CIS implementations affect professionals' well-being over time. The study also used self-reported assessment in the dependent variables, which may introduce bias. While objective measures might have offered more robust results, the self-reported measures used, such as SRIS, have been successfully applied in previous studies (e.g. Heponiemi et al., 2019a, 2021; Kaihlanen et al. 2020; Urnberg et al. 2022). It should also be taken into account that the SRIS was a mean of only two items and the Cronbach's alpha value was to some extent low, however being still at an acceptable level (Cronbach's alpha >0.6) (Loewenthal and Lewis 2018).

In addition, we adjusted our analyses for age, gender, working environment, and time pressure, but there may potentially be other confounding factors which may influence the associations. For example, job satisfaction and work–life balance, which were not included in the study, could also play a significant role in the well-being of social welfare professionals. Also, in addition to possible CIS implementations, other digital services may have been implemented due to the COVID-19 pandemic close to the data collection of our study, which may have affected the SRIS levels among the SWPs. Furthermore, the pandemic may have contributed to the decline in well-being in general.

Further, Finland's high level of digitalization may limit the generalizability of these findings to other countries with less advanced digital infrastructures. This difference in digital development

could mean that the results may not apply to contexts where technological implementations are at an earlier stage. Moreover, response bias should be considered, as individuals particularly affected by CIS implementations may have been more inclined to participate, skewing the results. Moreover, generalizing our findings to countries with dissimilar health care systems or cultural context should be done cautiously.

Considering these limitations, future research would benefit from employing longitudinal research designs to capture the long-term effects of information system implementation on the well-being of SWPs. Such research could provide deeper insights into how stress and adaptation evolve over time, addressing gaps in understanding both short-term and sustained impacts. Additionally, future investigations should incorporate other influencing factors, such as organizational culture, job satisfaction, and work-life balance, to offer a more comprehensive view of how these variables shape the well-being outcomes associated with CIS implementation. Finally, comparative studies across international contexts are essential to examine how these implementations affect professionals in diverse countries and cultural environments, offering a broader perspective and enabling cross-country learning. Furthermore, because research on SWPs' stress-related reactions to digital implementations is scarce and existing CISs in social services need to be updated from time to time, more research is needed on how to successfully implement CISs and other digital services in social welfare while ensuring well-being at work.

Conclusion

This study highlights that recent implementations of CISs can increase stress levels among SWPs, especially those who are involved in developing these systems and who are dissatisfied with the software providers' development work. Based on our findings, there are some practical steps how organizations can make the implementation process smoother and more supportive for SWPs. First, it is important to allocate sufficient time, training, and resources to SWPs who participate in the development work to reduce the additional demands placed on them. By ensuring that employees have the necessary tools and support, organizations can mitigate the stress associated with these implementations. Second, software providers must enhance their feedback processes, ensuring that professionals' concerns are addressed promptly, and system updates are designed to meet the actual needs of the end users. This could be achieved through regular consultations and user-centric design approaches that involve SWPs from the early stages of development. Third, to minimize stress during CIS implementations, organizations should develop tailored implementation strategies that account for the existing workload of SWPs. These strategies could include phased implementations, increased managerial support during implementation, and clear communication about the expected benefits and challenges of the new system. By focusing on these specific measures, organizations can create a smoother transition to a new CIS, improving both system effectiveness and SWPs' well-being.

Disclosure statement

JN is and SS has been employed by one software provider that produces information system in Finland. Their employer did not provide any support, financial or otherwise, for the study. This software provider was not involved in the design of the study or in the collection, analysis, and interpretation of the data.

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PUBLICATION III

Factors Contributing to Successful Information System Implementation and Employee Well-Being in Health Care and Social Welfare Professionals: Comparative Cross-Sectional Study

Nadav J., Kaihlanen A-M., Kujala S., Keskimäki I., Viitanen J., Salovaara S., Saukkonen P., Vänskä J., Vehko T., Heponiemi T.

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Original Paper

Factors Contributing to Successful Information System Implementation and Employee Well-Being in Health Care and Social Welfare Professionals: Comparative Cross-Sectional Study

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Abstract

Background: The integration of information systems in health care and social welfare organizations has brought significant changes in patient and client care. This integration is expected to offer numerous benefits, but simultaneously the implementation of health information systems and client information systems can also introduce added stress due to the increased time and effort required by professionals.

Objective: This study aimed to examine whether professional groups and the factors that contribute to successful implementation (participation in information systems development and satisfaction with software providers' development work) are associated with the well-being of health care and social welfare professionals.

Methods: Data were obtained from 3 national cross-sectional surveys (n=9240), which were carried out among Finnish health care and social welfare professionals (registered nurses, physicians, and social welfare professionals) in 2020-2021. Self-rated stress and stress related to information systems were used as indicators of well-being. Analyses were conducted using linear and logistic regression analysis.

Results: Registered nurses were more likely to experience self-rated stress than physicians (odds ratio [OR] –0.47; $P>.001$) and social welfare professionals (OR –0.68; $P<.001$). They also had a higher likelihood of stress related to information systems than physicians (b=–.11; $P<.001$). Stress related to information systems was less prevalent among professionals who did not participate in information systems development work (b=–.14; $P<.001$). Higher satisfaction with software providers' development work was associated with a lower likelihood of self-rated stress (OR –0.23; $P<.001$) and stress related to information systems (b=–.36 $P<.001$). When comparing the professional groups, we found that physicians who were satisfied with software providers' development work had a significantly lower likelihood of stress related to information systems (b=–.12; $P<.001$) compared with registered nurses and social welfare professionals.

Conclusions: Organizations can enhance the well-being of professionals and improve the successful implementation of information systems by actively soliciting and incorporating professional feedback, dedicating time for information systems development, fostering collaboration with software providers, and addressing the unique needs of different professional groups.

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Keywords: implementation; health information systems; client information systems; stress; healthcare professionals; social welfare professionals; clinician well-being; workplace stress

Introduction

The integration of information systems (ISs) into health care and social welfare organizations has prompted significant changes in patient and client work [1]. The integration and implementation of these systems are expected to provide many benefits for professionals, such as better documentation, decision-making, and information management [2-4]. However, it is noteworthy that while health information systems (HISs) and client information systems (CISs) offer many advantages to health care and social welfare professionals (SWPs), their implementation can also introduce additional stress due to the increased time and effort required from the professionals, which reduces the time available for direct patient or client care [1,5-8]. Furthermore, there are instances where professionals struggle to use the established systems [9-11], receive insufficient training or support from the organizations [5,6,9,12-14], or must constantly adjust to new working methods because of new systems. [15,16].

Health care and SWPs work is often burdensome, and the COVID-19 pandemic placed an additional strain on them and challenged their ability to cope with everyday work [17]. Stress among these professionals has been growing in recent years for reasons such as increasing workload [18,19], staff shortage [20-22], shift work and irregular hours [23,24], and emotional and psychological challenges in patient or client work [25-27]. Consequently, poorly functioning and constantly changing ISs may increase professionals' stress even more [11,28,29].

Stress related to information systems (SRIS) among health care professionals has been a subject of interest in recent years [5,7,28,30-34]. A longitudinal study by Heponiemi et al [28] found that SRIS had increased progressively among Finnish physicians. Poor usability of HISs has been found to be associated with physicians' stress [11]. Also, registered nurses (RNs) experience higher levels of SRIS when using HIS with poor usability [7] or if they have experienced an HIS implementation recently [5]. Furthermore, SRIS has previously been found to be associated with time pressure, cognitive workload, and high levels of technical problems related to the HIS among physicians and RNs [5,9,28,29]. Among SWPs, this kind of research has been conducted relatively rarely.

It has been suggested that end user participation in IS development is central [35], as it may improve the success of the implementation and even have a positive association with professionals' well-being [36,37]. Based on Finnish national surveys, RNs, physicians, and SWPs are willing to participate in IS development [37-39]. However, there seems to be a lack of appropriate methods to effectively involve them and incorporate their feedback into the development work [37,38]. According to Martikainen et al [38], one of the reasons for RNs', physicians', and SWPs' reluctance to participate in the development is that they do not have working time allocated for it. In addition, earlier negative experiences, for example, not being able to influence the development in their preferred ways, may reduce professionals' willingness to prioritize their time for IS development work [38]. In addition, because CISs in social welfare have often been developed from administrative perspectives [40-44], professionals in the field may feel that their opportunities to influence are weak. This may lead to a situation where professionals are cautious about the following implementations and reluctant to participate in the development work [40,41].

Being able to give feedback about the ISs is important for professionals, as it gives them the feeling that they can have an influence [6]. Furthermore, it may also give the software providers an opportunity to further develop the systems based on the professionals' needs. Studies conducted in Finland have identified a significant gap between the perceptions of software developers and the experiences of health care professionals and SWPs concerning user feedback and its integration into software development processes [35,37,38,45]. While a significant majority of developers (90%) expressed interest in user feedback, with 81% claiming to consider end users' opinions and experiences during software development, professionals, including nurses, physicians, and SWPs, reported a different reality [37,38]. Only half of the professionals knew who to contact and how to provide feedback, and a mere few believed that vendors were genuinely interested in end users' viewpoints or that corrections and change requests were implemented according to their suggestions or within a reasonable time frame [35,37,38,45]. Furthermore, an interview study among health care and SWPs found that it is central to the professionals that everyone knows where to give feedback and that it is acted upon [6]. If the feedback process regarding IS development does not work smoothly, it has been shown to affect physicians' well-being by increasing their stress [9].

Although there are some studies that have examined the well-being of health care professionals in relation to HISs, they have mainly focused on one professional group at a time and more on the IS usability perspective [7,9,30]. However, little research addresses health care professionals' and SWPs' well-being in relation to the factors that can contribute to the success of implementations. Moreover, few studies, if any, have compared these professional groups in this setting. Therefore, we aimed to examine whether the factors that contribute to the successful implementation of information systems (participation in HIS or CIS development and satisfaction with software providers' development work) are associated with well-being among RNs, physicians, and SWPs. More specifically, we aimed to examine whether there are differences in potential associations between these professional groups. It is important to study these professional groups, because they are key users of ISs in the Finnish

health care and social welfare field, and their daily workflow is directly impacted by the efficiency and usability of these systems [46]. By examining and comparing the well-being of these professional groups, we may get valuable insights into the unique challenges and stressors faced by each group and identify potential areas for improvement in IS development work.

The specific research questions were as follows: (1) Are professional groups, participation in HIS or CIS development, and satisfaction with software providers' development work associated with self-rated stress and SRIS? (2) Are there differences between professional groups in the associations of (a) participation in HIS or CIS development, and (b) satisfaction with software providers' development work with self-rated stress and SRIS?

Methods

Sample

The data were collected through online surveys [47] among RNs, public health nurses, and midwives (with at least bachelor-level education and younger than the age of 65 years) during March and April 2020, among SWPs (with at least bachelor-level education; eg, social workers and social counselors and younger than the age of 65 years) during September and October 2020, and among physicians (licensed physicians younger than 65 years) during January and March 2021.

The RNs' contact information were collected by the Finnish Nurses Association, Tehy (the union of health and social care professionals in Finland), and the National Professional Association for the interests of experts and managers in health care (TAJA; n=29,283). The SWPs' contact information were collected by the Union of Professional Social Workers (Talentia), the Trade Union for the Public and Welfare Sectors (JHL), and Social Science Professionals (YKA; n=12,471). The contact information of physicians were collected by the Finnish Medical Association (n=19,142). Invitations to participate in the questionnaire were sent via e-mail to professionals who were registered members of the abovementioned trade unions and professional associations. For RNs, 1 reminder was sent, while physicians received 3 reminders. Notably, for SWPs, the survey link was also disseminated through social media when the response rate was at a risk to remain low [37].

The collected contact information from the abovementioned trade unions and professional associations represents a substantial portion of the respective professional populations in Finland, comprising 47.23% (29,283/62000) of all working-age RNs, 40.23% (12,471/31,000) of all working-age SWPs, and 90.51% (19,142/21,148) of all working-age physicians [39,48]. Detailed description of the data collection from RNs [5,39,49], physicians [39,50], and SWPs [39,51] can be found elsewhere. The final sample for this study included 9240 respondents: 3610 RNs (with a 12% response rate), 4640 physicians (with a 24% response rate), and 990 SWPs (with 8% response rate). The response rate for SWPs could not be precisely calculated because the survey link was also distributed through social media.

Ethical Considerations

Participation in the surveys was voluntary, and all participants provided informed consent by actively engaging in the study through questionnaire responses. Ethical approval for the questionnaires used with nurses and SWPs was applied from the Finnish Institute for Health and Welfare (THL/482/6.02.01/2020). For the physician's questionnaire, an ethics committee statement was not applied. This decision aligns with the guidelines outlined by the Finnish National Board on Research Integrity [52], as surveying respondents for their opinions without anticipated harm does not require an ethics committee statement.

Context

In Finland, during the data collection, the municipalities were responsible for organizing health and social services [53]. However, a substantial structural change took place in January 2023 with the creation of 22 well-being service counties (WBSCs). This change reflects a decisive move toward integrating health and social services, emphasizing a commitment to offering more coordinated, person-centered, and sustainable services. The primary goal of this integration is to eliminate historical divisions between health and social services, promoting a seamless and comprehensive approach to well-being for all residents [54]. The WBSCs are responsible for organizing primary care, secondary health care, and social and rescue services for their residents [55]. These counties are governed by elected councils and are funded through the state budget. Professionals working in the public sector typically receive fixed budget-based salaries in these counties. The WBSCs have the flexibility to provide services independently or in collaboration with other WBSCs [55,56].

Finland is one of the leading countries in digitalization [57], and along with the other Nordic countries has made considerable progress in the development and implementation of HISs and CISs in the health care and social welfare field [39]. For example, health care professionals' access to HISs is 100% in both public and private sectors, and access to CISs in social welfare is nearly 100% in the public sector and 75% in the private sector [58,59]. There are more than 20 HIS and CIS brands used in the health care and social welfare field in Finland [60]. The Finnish Ministry of Social Affairs and Health consistently initiated national surveys focused on monitoring the status and emerging trends in the realm of electronic health and electronic welfare services in Finland. The primary goal was to gather empirical data that inform the ongoing development of these sectors [61].

Measurements

The well-being of professionals was measured using 2 stress-related indicators: self-rated stress and SRIS.

Self-rated stress was measured with a validated single-item measure stating that "Stress refers to a situation in which a person feels tense, restless, nervous, or anxious, or finds it hard to sleep because of constantly worrying about things,"

and asking whether the respondent was feeling this kind of stress nowadays [62]. This variable was rated on a 5-point scale ranging from 1 (not at all) to 5 (very much). For the analyses, responses were coded into 2 categories (0=no stress and 1=stressed), so that the original options 1-2 were "no stress" and options 3-5 were "stressed."

SRIS was measured with two items asking how often (1) changing information systems or (2) awkward or poorly functioning systems have disturbed, worried, or burdened professionals' work during the past 6 months. In the SWPs' questionnaires, the items were rated on a 5-point Likert scale and the options ranged from 1 (very rarely or never) to 5 (very often or constantly). However, in the physicians' questionnaire, the options were in the opposite order and were therefore reverse-coded. In the RNs' questionnaire, the items were rated on a 6-point Likert scale, and the options ranged from 1 (never) to 6 (constantly). The items were combined into a mean sum variable (Cronbach α=0.74). The mean scores were standardized with *z* scores to enable comparability (explained in more detail in the Statistical Analyses section). This measure has been developed in Finland and it has been used among physicians and RNs and associated, for example, with time pressure, cognitive workload, and high levels of technical problems of the HIS [eg, 5,9,14,28,29].

The factors contributing to the success of the implementation were measured using 2 measures, which were participation in HIS or CIS development and satisfaction with software providers' development work.

Participation in HIS or CIS development was assessed by asking whether the respondent participated in HIS or CIS development work. There were three response options: (1) "yes, some of my working time has been allocated for such development work," (2) "yes, in addition to my work," and (3) "no."

Satisfaction with software providers' development work was assessed using 3 statements from the validated National Usability-Focused HIS Scale [3]. Respondents were asked to assess three statements based on their experience: (1) the software provider is interested in end users' feedback about the system, (2) the software provider implements corrections and change requests according to the suggestions of the end users, and (3) corrections and change requests are implemented within a reasonable time frame. The answer options in the physicians' and SWPs' questionnaires ranged from 1 (fully agree) to 5 (fully disagree). However, in the nurses' questionnaire, the options ranged from 1 (fully agree) to 5 (disagree) and additionally an option 6 (I cannot say), which was coded as a missing value. These items were reverse coded to ensure more logical data analysis and then combined into a mean sum variable (Cronbach α=0.89).

Respondents' gender (1=women, 2=men, 3=other or do not want to say), age (1=<35, 2=35-44, 3=45-54, and 4=>54 years), and working sector (1=public, 2=private/other) were also requested in the survey and coded similarly. These adjustment variables were used because they have played an important role in professionals' well-being in previous studies [eg, 1,11,30]. Measures used in this study can be found in the Multimedia Appendix 1.

Statistical Analyses

Because the response scales in the RNs' questionnaire differed from the physicians' and SWPs' questionnaires, the means of SRIS were standardized with *z* scores. The *z* score describes how many SDs you are away from the mean (mean always=0 and SD always=1). The *z* score is positive if the value is higher than the mean, and negative if lower than the mean [63]. This allowed us to make comparisons when we merged the data [64]. Before the analysis, we used the multiple imputation method in R statistical software to impute the missing data [65]. All the study variables were included in the imputation models and the datasets were imputed 5 times [66,67].

Logistic regression analyses were conducted with professional groups, participation in HIS or CIS development, and satisfaction with software providers' development work as independent variables and self-rated stress as the dependent variable (binarily coded). Linear regression analyses were used to examine the associations of the same above-mentioned independent variables with SRIS (continuous dependent variable). In addition, we tested that the data met the assumptions of linearity, homoscedasticity, multicollinearity, and that the residuals were approximately normally distributed. Analyses of the main effects were conducted in 2 steps. First, the univariable effects were examined. Second, the fully adjusted model included the professional group, participation in HIS or CIS development, satisfaction with software providers' development work, and the adjustment variables age, gender, and working sector.

In addition, we examined the potential interactions of the professional group with (1) participation in HIS or CIS development and (2) satisfaction with software providers' development work (in separate analyses) for stress and SRIS. These analyses were also adjusted for age, gender, and working sector. All the analyses were conducted using RStudio (version 4.1.1; R Core Team 2020).

Results

Characteristics of the Professional Groups

The characteristics of the respondents are presented in Table 1. Most of the respondents were women (RNs: 93% [3340/3610]; physicians: 64% [2978/4640]; and SWPs: 92% [913/990]) and worked in the public sector (RNs: 86% [3115/3610]; physicians: 80% [3698/4640]; and SWPs: 86% [846/990]), which corresponds to the general gender and employment structure of these professionals in Finland [68]. Almost 25% of the RNs (796/3610) and physicians (1116/4640) had participated in HIS development, whereas 33% (326/990) of SWPs had participated in CIS development.

Table 1. Characteristics of the professional groups.

Characteristics	All (N=9240)	RNs[a] (n=3610)	Physicians (n=4640)	SWPs[b] (n=990)
Gender, n (%)				
Women	7231 (78.3)	3340 (92.5)	2978 (64.2)	913 (92.2)
Men	1934 (20.9)	249 (6.9)	1631 (35.1)	54 (5.5)
Other	75 (0.8)	21 (0.6)	31 (0.7)	23 (2.3)
Age (years), n (%)				
<35	1882 (20.4)	739 (20.5)	958 (20.6)	185 (18.7)
35-44	2403 (26)	833 (23.1)	1224 (26.4)	346 (35)
45-54	2529 (27.3)	1108 (30.7)	1161 (25)	260 (26.3)
>54	2426 (26.3)	930 (25.7)	1297 (28)	199 (20)
Working sector, n (%)				
Public	7659 (82.3)	3115 (86.3)	3698 (79.7)	846 (85.5)
Private or other	1581 (17.7)	495 (13.7)	942 (20.3)	144 (14.5)
Participation in HIS[c] or CIS[d] development, n (%)				
Yes, I have been given time for it	480 (5.2)	216 (6)	202 (4.3)	62 (6.3)
Yes, in addition to my work	1758 (19)	580 (16)	914 (19.7)	264 (26.7)
No	7002 (75.8)	2814 (78)	3524 (76)	664 (67)
Self-rated stress, n (%)				
No	3299 (35.7)	1037 (28.7)	1830 (39.4)	432 (43.6)
Yes	5941 (64.3)	2573 (71.3)	2810 (60.6)	558 (56.4)
Stress related to information systems, mean (SD)[e]	—[f]	3.7 (1.13)	3.5 (1.07)	3.06 (0.97)
Satisfaction with software providers' development work, mean (SD)[g]	—[f]	2.56 (1.07)	2.24 (1.02)	2.71 (0.86)

[a]RN: registered nurse.
[b]SWP: social welfare professional.
[c]HIS: health information systems.
[d]CIS: client information systems.
[e]Range 1-6 (registered nurses) and range 1-5 (physicians and social welfare professionals).
[f]Not applicable.
[g]Range 1-5 (all professional groups).

Main Effects on Professionals' Self-Rated Stress

Table 2 shows the results of logistic regression analyses. Professional group and satisfaction with software providers' development work were both associated with self-rated stress. Physicians and SWPs had significantly lower odds of self-rated stress than RNs. In addition, higher satisfaction with software providers' development work was associated with lower odds of self-rated stress.

Table 2. The results of logistic regression analysis for self-rated stress.

Variables	Univariable model		Fully adjusted model[a]	
	OR[b] (95% CI[c])	*P* value	OR[b] (95% CI)	*P* value
Professional group				
Registered nurses	1	_[d]	1	_[d]
Physicians	–0.48 (–0.57 to –0.38)	<.001	–0.47 (–0.57 to –0.36)	<.001
Social welfare professionals	–0.65 (–0.80 to –0.51)	<.001	–0.68 (–0.83 to –0.53)	<.001
Participation in HIS[e] or CIS[f] development				
Yes, I have been given time for it	1	_[d]	1	_[d]
Yes, in addition to my own work	0.07 (–0.14 to –0.28)	.50	0.11 (–0.11 to –0.32)	.32
No	.008 (–0.19 to –0.20)	.93	–0.06 (–0.26 to –0.14)	.56
Satisfaction with software providers' development work[b]	–0.19 (–0.23 to –0.14)	<.001	–0.23 (–0.28 to –0.19)	<.001

[a]Adjusted for gender, age, working sector, professional group, participation in health information systems or client information systems development and satisfaction with software providers' development work; R^2 (McFadden)=0.03.
[b]The odds ratio represents the odds ratio for one unit change in the continuous independent variable, indicating the odds for passing from low stress to high stress.

Variables	Univariable model		Fully adjusted model[a]	
	OR[b] (95% CI[c])	*P* value	OR[b] (95% CI)	*P* value

[c]Confidence interval describes the amount of uncertainty associated with a sampling method.
[d]Not applicable (reference group).
[e]HIS: health information systems.
[f]CIS: client information systems.

Main Effects on Professionals' Stress Related to Information Systems

The results of linear regression analyses are shown in Table 3. Professional group, participation in HIS or CIS development, and satisfaction with software providers' development work were all associated with SRIS. In the fully adjusted model, physicians had a significantly lower likelihood of SRIS than RNs. Furthermore, the professionals who did not participate in the HIS or CIS development work had a significantly lower likelihood of SRIS. Moreover, professionals had significantly lower likelihood of SRIS if they were satisfied with the software providers' development work.

Table 3. The results of linear regression analysis for stress related to information systems.

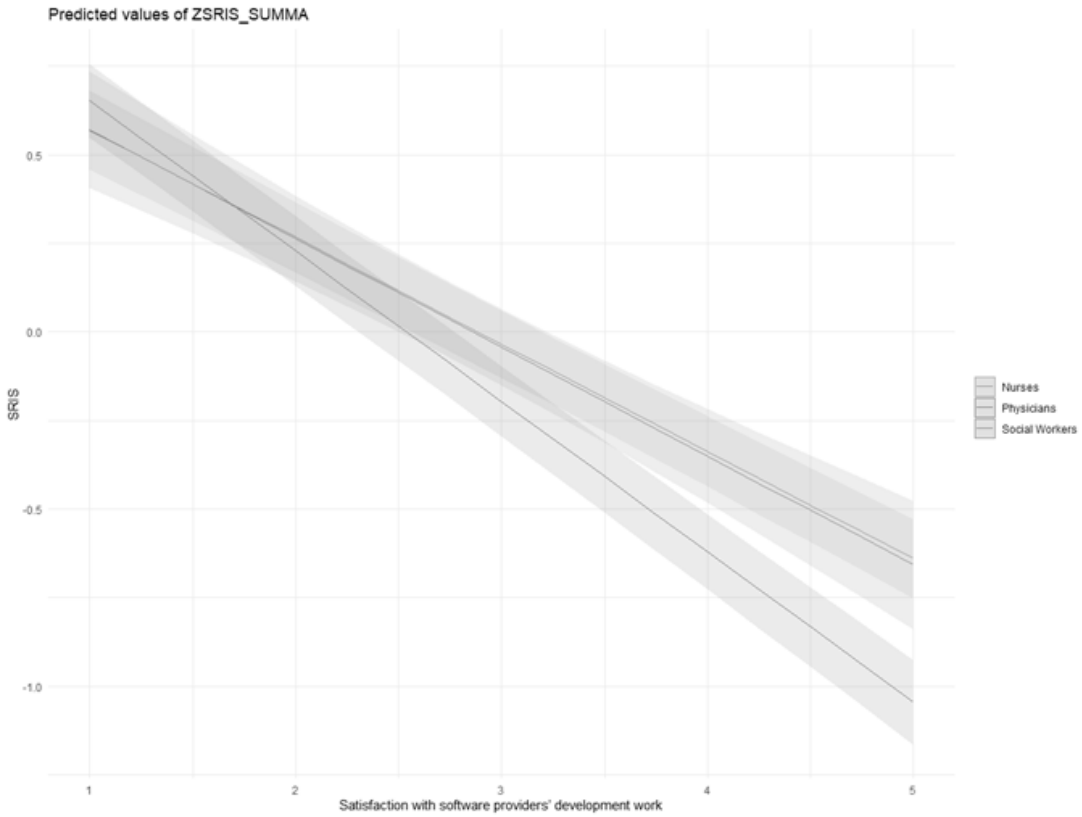
Variables	Univariable model		Fully adjusted model[a]	
	b[b] (95% CI[c])	*P* value	b[b] (95% CI)	*P* value
Professional group				
Nurses	0	[d]—	0	[d]—
Physicians	–.002 (–0.05 to 0.04)	.92	–0.11 (–0.16 to –0.07)	<.001
Social welfare professionals	–.005 (–0.08 to 0.06)	.89	.007 (–0.07 to 0.06)	.83
Participation in HIS[e] or CIS[f] development				
Yes, I have been given time for it	0	[d]—	0	[d]—
Yes, in addition to my own work	0.05 (–0.05 to 0.16)	.29	–0.02 (–0.11 to 0.07)	.65
No	–0.06 (–0.16 to 0.03)	.18	–0.14 (–0.23 to –0.06)	<.001
Satisfaction with software providers' development work[b]	–0.35 (–0.37 to –0.33)	<.001	–0.36 (–0.38 to –0.34)	<.001

[a]Adjusted for gender, age, working sector, professional group, participation in health information systems or client information systems development and satisfaction with software providers' development work; R^2=0.15
[b]Regression coefficients represent the predicted change in the value of dependent variable for each one unit increase in the value of independent variable. Negative association means that when independent variables' values increase, dependent variables' values decrease.
[c]Confidence interval describes the amount of uncertainty associated with a sampling method.
[d]Not applicable.
[e]HIS: health information systems.
[f]CIS: client information systems,

The Interactions

There was a significant interaction effect between the professional group and satisfaction with software providers' development work for SRIS. As can be seen in Figure 1, physicians had a significantly lower likelihood of SRIS (b=–0.12, 95% CI –0.16 to –0.08; *P*<.001) compared with RNs and SWPs if they were satisfied with software providers' development work.

Figure 1. Interaction between professional groups and satisfaction with software provider's development work for SRIS (the SRIS's mean measure was standardized using *z* scores, where the value of the *z* score describes how many SDs you are away from the mean [mean always=0]).



Discussion

Principal Findings

This study examined whether the factors that contribute to the successful implementation of information systems (participation in HIS or CIS development and satisfaction with software providers' development work) are associated with well-being among RNs, physicians, and SWPs. More specifically, we examined whether there are differences between these professional groups, to gain valuable insights into the unique challenges and stressors faced by each professional group and highlight potential areas for improvement in IS development work. Our findings suggest that professional group, participation in HIS or CIS development, and satisfaction with software providers' development work are significantly associated with professionals' well-being and we found that there exist significant differences between these professional groups.

Limitations

This study acknowledges some limitations. First, while the sample comprised 9240 health care professionals and SWPs, response rates were notably lower among RNs and SWPs, possibly affecting generalizability. However, structurally collected data correspond quite well to the overall composition of the professional groups, so it can be assumed that the results can be generalized with certain reservations. Furthermore, the response rate for SWPs may not be as reliable as desired because invitations to participate were sent via email and social media when the number of respondents was at risk of remaining low. Consequently, some respondents may have received the link from colleagues or via social media [37]. Second, caution is needed when extending findings to less digitally advanced countries, given Finland's advanced digitalization [57]. Third, due to the cross-sectional nature of the study, causal relationships cannot be inferred. Fourth, while adjustments were made, unmeasured confounders like time pressure might have impacted results. Fifth, self-reported measures were used, not objective tests. Sixth, the ongoing personnel shortage and the COVID-19 pandemic during data collection might have influenced responses. Finally, the data collection took place at slightly different times, between March 2020 and February 2021.

Comparison With Prior Work

The study revealed that RNs experienced higher levels of self-rated stress than physicians and SWPs. There are

several factors that might contribute to the higher stress levels in nursing, such as the ongoing shortage of nurses in many countries, including Finland [19,24]. Furthermore, our findings reveal that physicians, whose SRIS has steadily increased in recent years [28] experienced significantly less SRIS than RNs. The higher level of SRIS among RNs may be explained by the common tendency for RNs to experience higher stress overall, as supported by the earlier findings [69,70]. Moreover, past literature has shown that the implementation of IS can be complex and time-consuming and requires RNs to invest significant effort in adapting new technologies to their workflows [15,16]. This can result in heightened stress levels among RNs [1,5]. Furthermore, a recent study found that ISs have led to a transfer of work tasks, specifically from physicians to RNs, resulting in an increased workload for RNs [71]. However, additional research is needed to validate these observations within the specific context of our study.

Participation in IS development work is an important factor for the success of IS implementations [6,72-74]. However, our findings indicate that professionals who did not participate in HIS or CIS development were experiencing less SRIS. Balancing the demands of daily work responsibilities while actively participating in IS development can be overwhelming and lead to stress for professionals. Participation in IS development work may lead to stress due to limited technical expertise or familiarity with a complex IS, leading to difficulties in understanding and effectively using the technology [6,14]. Furthermore, one possible explanation for higher stress levels among professionals is that those who possess digital competence and actively engage in IS development often have their roles emphasized and bear greater responsibility for ISs, resulting in a heavier workload compared with their peers [71].

Moreover, professionals often encounter stress as they navigate the challenges associated with change management, such as resistance from colleagues, uncertainty regarding the impact of changes, and potential disruptions to established routines [32,33]. Previous research indicates that organizations can facilitate professionals in allocating time for IS development work through various means. These include creating dedicated time slots for development, redistributing tasks, adjusting workload, and fostering a supportive work environment [37,38,75,76]. These strategies may help professionals engage more effectively in IS development activities while managing their regular work responsibilities.

Our study highlighted that dissatisfaction with software providers' development work was associated with both self-rated stress and SRIS among professionals. Our findings can partially be explained by the previous studies conducted in Finland, where they found that only half of the professionals knew how and to whom to send their feedback, and only a few believed that vendors were genuinely interested in their viewpoints or that the suggested corrections and change requests were implemented within a reasonable time frame [35,37,38,45]. However, further research is needed to explore this aspect in greater depth. Prior research has highlighted the importance of effective collaboration between professionals and software providers, including responsiveness to feedback and the use of professionals' input and expertise [6,37,38]. It has also been found that the lack of control and influence over decision-making processes, along with inadequate consideration of professionals' viewpoints, can lead to frustration and stress [33]. For instance, SWPs often perceive that CISs are primarily developed from an administrative perspective to align with organizational objectives, thereby not fully incorporating professionals' perspectives [43,44].

Our findings emphasize the importance of satisfaction with software providers' development work, especially among physicians. Physicians had a significantly lower likelihood of SRIS compared with nurses and SWPs if they were satisfied with software providers' development work. This may indicate that physicians value the efficient performance of software providers' work within the context of the IS development process. This finding is a significant addition to prior research, which highlighted physicians' high expectations from software provider, particularly regarding responsiveness to end-user feedback and implementation of corrections within a reasonable time frame [38]. Physicians' active participation in HIS development work offers a sense of job control [10], which is crucial due to their primary responsibility for critical clinical decisions that directly affect patient care and outcomes. A smooth collaboration with the system provider ensures that the IS aligns with their decision-making needs, minimizing the risk of errors or delays in patient care [77].

Conclusions

This study offers valuable insights into the factors impacting the successful implementation of ISs and their influence on the well-being of RNs, physicians, and SWPs. It emphasizes the importance of actively seeking and incorporating professional feedback, allocating dedicated time for HIS development, fostering collaborations with software providers, and addressing the unique needs of each professional group. In light of the nurse shortage, it is crucial to allocate dedicated time for HIS development, particularly for those involved in IS development, independently from patient care. Physicians can benefit from stronger collaboration with software providers, emphasizing feedback incorporation and job control through their involvement in HIS development. SWPSs' unique needs should be prioritized in the development of CISs, going beyond administrative tasks and objectives. By addressing these factors, health care and social welfare organizations can enhance the well-being of professionals, improve the successful implementation of ISs, and ultimately enhance the quality of care and services provided to patients and clients. Future research should explore well-being among these professional groups in relation to other factors crucial for successful implementation, such as communication and training.

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Authors' Contributions

JN, A-MK, and TH conceptualized the study and developed the methodology. JN conducted the analysis and wrote the original draft. All authors reviewed and edited the manuscript. TH provided supervision for the study.

Conflicts of Interest

JN is and SS has been employed by one software vendor that produces information systems in Finland. Their employer did not provide any support to the study and was not involved in the design of the study or in the collection, analysis, or interpretation of the data.

Multimedia Appendix 1

Measures used in the study.
[DOCX File (Microsoft Word File), 24 KB-Multimedia Appendix 1]

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Abbreviations

CIS: client information system
HIS: health information system
IS: information system
OR: odds ratio

RN: registered nurse
SRIS: stress related to information systems
SWP: social welfare professional
WBSC: well-being service county

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