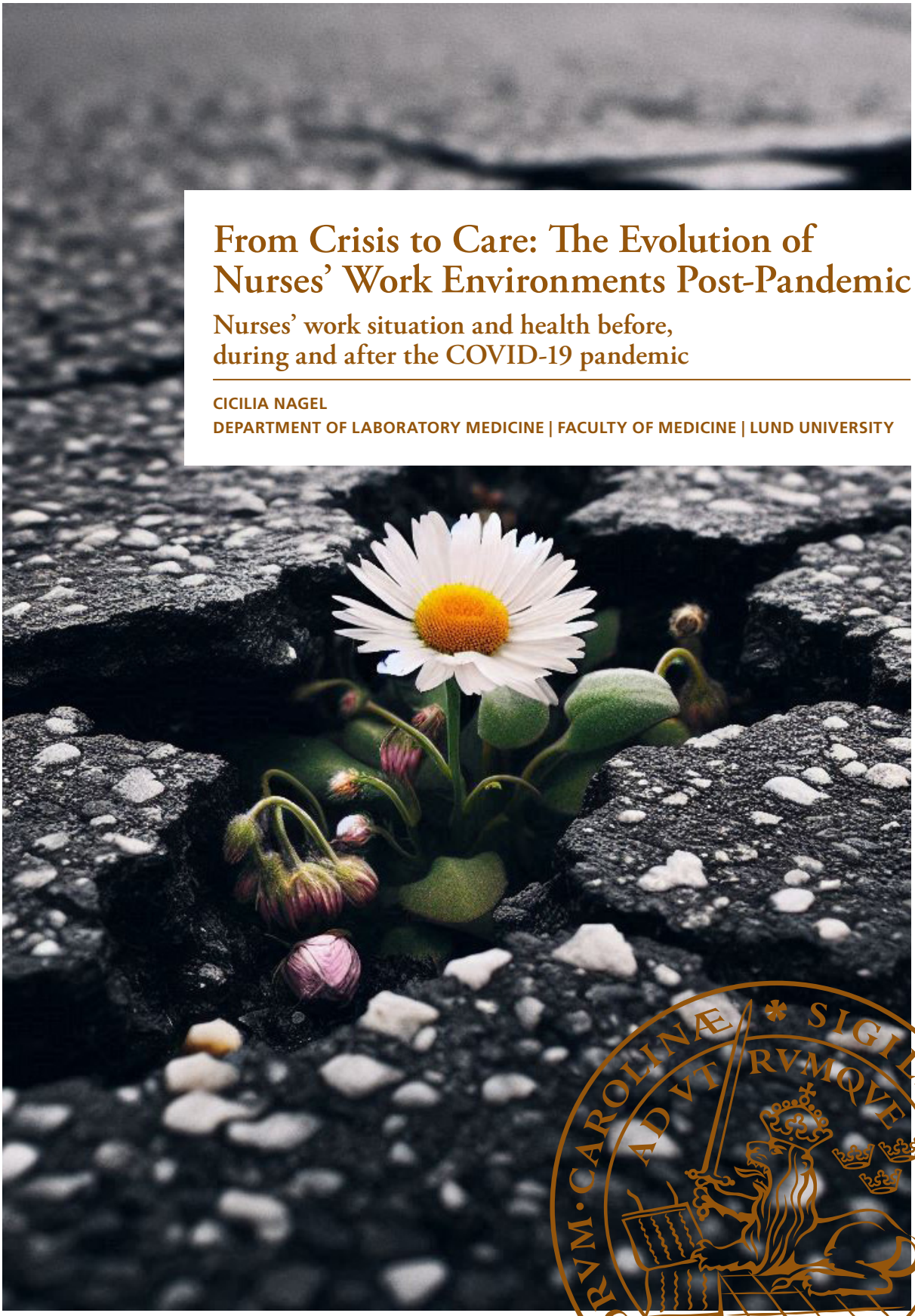

From Crisis to Care: The Evolution of Nurses' Work Environments Post-Pandemic

Nurses' work situation and health before, during and after the COVID-19 pandemic

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Abstract:

There is a knowledge gap regarding what contributes to staff well-being in extreme work situations. Nurses play a critical role in healthcare, but face high workloads, risk of burnout and lack of resources. The COVID-19 pandemic has highlighted the important role of nurses and the challenges they face, highlighting the need to manage work-related stress and promote self-care. A good work environment, characterized by safety, support and balance, is crucial for both patient care and the well-being of the nursing staff. This thesis examines how the COVID-19 pandemic affected the nurses' work situation and health and what measures are needed in similar scenarios. To achieve this aim, both questionnaires and interviews were used. The SwAge model was used as the theoretical framework throughout the research process. During the COVID-19 pandemic, nurses faced increased workloads, lack of control, and ethical dilemmas, leading to stress and moral distress. They experienced physical and mental health issues due to inadequate resources and support. Despite these challenges, some found satisfaction in their roles, professional growth, and teamwork. The pandemic highlighted the need for better workload management, support systems, and organizational responses to improve nurses' well-being and resilience, transforming stress into strength through a salutogenic approach. In conclusion, the pandemic has shown the need to empower nurses by giving them more control over their duties and responsibilities, both as individuals and as a group. This increases job satisfaction, productivity and psychological resilience. The insights from this research are essential for designing healthy and sustainable workplaces in the future, especially with a focus on nurses' work environment. This knowledge could contribute to reduce sickness absence, prevent nurses leaving the profession, promote health and increase the opportunities for longer careers, in line with the UN's sustainability goals in Agenda 2030.

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To my monster-princess, I love you more than life itself. To T – thank you for putting up with me and for taking my mind off work by our weekly rituals of GT and "junk -TV" and lastly to my mom and dad, my twin pillars who have always told me I can achieve anything if I work for it.

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Abstract

There is a knowledge gap regarding what contributes to staff well-being in extreme work situations. Nurses play a critical role in healthcare, but face high workloads, risk of burnout and lack of resources. The COVID-19 pandemic has highlighted the important role of nurses and the challenges they face, highlighting the need to manage work-related stress and promote self-care. A good work environment, characterized by safety, support and balance, is crucial for both patient care and the well-being of the nursing staff. This thesis examines how the COVID-19 pandemic affected the nurses' work situation and health and what measures are needed in similar scenarios. To achieve this aim, both questionnaires and interviews were used. The SwAge model was used as the theoretical framework throughout the research process. During the COVID-19 pandemic, nurses faced increased workloads, lack of control, and ethical dilemmas, leading to stress and moral distress. They experienced physical and mental health issues due to inadequate resources and support. Despite these challenges, some found satisfaction in their roles, professional growth, and teamwork. The pandemic highlighted the need for better workload management, support systems, and organizational responses to improve nurses' well-being and resilience, transforming stress into strength through a salutogenic approach. In conclusion, the pandemic has shown the need to empower nurses by giving them more control over their duties and responsibilities, both as individuals and as a group. This increases job satisfaction, productivity and psychological resilience. The insights from this research are essential for designing healthy and sustainable workplaces in the future, especially with a focus on nurses' work environment. This knowledge could contribute to reduce sickness absence, prevent leaving the profession, promote health and increase the opportunities for longer careers, in line with the UN's sustainability goals in Agenda 2030.

Populärvetenskaplig sammanfattning

Introduktion

COVID-19-pandemin har belyst vikten av att dra nytta av lärdomarna från krisen för att kunna tillämpa dessa vid framtida organisatoriska förändringar, såsom vid nya pandemier. Det finns en kunskapslucka kring vad som bidrar till personalens välbefinnande i extrema arbetssituationer, och det är viktigt att identifiera faktorer och processer i arbetsmiljön som påverkar både fysisk och psykisk hälsa. Idag utgör legitimerade sjuksköterskor cirka 59 % av den globala sjukvårdspersonalen och spelar en avgörande roll i vården. De möter dock hög arbetsbelastning, risk för utbrändhet och brist på resurser. Det råder en betydande brist på sjuksköterskor, förvärrad av demografiska förändringar och att många lämnar yrket tidigt. Genom COVID-19-pandemin har sjuksköterskornas viktiga roll belysts och de utmaningar de står inför, vilket understryker behovet av att hantera arbetsrelaterad stress och främja egenvård. En god arbetsmiljö, präglad av säkerhet, stöd och balans, är avgörande för både patientvården och vårdpersonalens välbefinnande. Arbetsmiljön bör främja hälsa och förebygga sjukdom. Empowerment och bra strukturstöd på arbetsplatsen leder till bättre organisatorisk effektivitet och nöjdare medarbetare.

Syfte och metoder

Denna avhandling undersöker hur COVID-19 pandemin påverkade sjuksköterskornas arbetssituation och hälsa samt vilka åtgärder som behövs. För att uppnå detta syfte användes både enkäter och intervjuer. SwAge-modellen användes som teoretisk ram genom hela forskningsprocessen, vilket gav en strukturerad och konsekvent grund för att analysera och tolka data, och säkerställde att slutsatserna var välgrundade och teoretiskt förankrade.

Huvudsakliga resultat

Många sjuksköterskor omplacerades mot sin vilja och upplevde brist på kontroll över sina scheman, med frekventa ändringar i sista minuten och ökade arbetstimmar, vilket ledde till stress. Trots trötthet och stress drevs de av en stark pliktkänsla att vårda patienter och stötta sina kollegor. Personalbrist och brist på personlig skyddsutrustning skapade etiska och moraliska problem. Sjuksköterskor rapporterade fysiska och långsiktiga emotionella symptom, med ökade arbetsrelaterade psykiska problem. De hade ofta otillräcklig tid för återhämtning mellan skiften, även om vissa lyckades ta pauser utanför arbetet. De kände frustration över att allmänheten inte följde riktlinjer och upplevde oärlighet från ledningen om skyddsutrustningens hållbarhet och effektivitet. Organisationer svarade effektivt med krisplaner, teamarbetet förbättrades, och sjuksköterskor fick starkt stöd från kollegor och i viss utsträckning chefer. De upplevde professionell tillväxt och tillfredsställelse i att vara behövda och göra skillnad, samt visade motståndskraft och innovativ problemlösning.

Sammanfattning

Sammanfattningsvis har pandemin visat behovet av att stärka sjuksköterskor genom att ge dem mer kontroll över sina uppgifter och ansvar. Pandemin betonade också vikten av att balansera omsorgsplikten med sjuksköterskors säkerhet och välbefinnande, samt behovet av stödjande ledningsstrukturer, adekvat resursallokering och en hälsosam arbetsmiljö. Sjuksköterskors erfarenheter avslöjade betydande stress och frustration, vilket understryker behovet av robusta stödsystem. Den motståndskraft som vissa sjuksköterskor visade belyser potentialen för posttraumatisk tillväxt och vikten av en stödjande arbetskultur. Att skapa en personcentrerad arbetsplats som värdesätter vårdpersonalens behov och välbefinnande är därför avgörande. Genom att prioritera sjuksköterskors hälsa och integritet kan vårdorganisationer bättre hantera framtida kriser och bibehålla hög standard på patientvården.

Praktiska tillämpningar

Insikterna från detta projekt är väsentliga för att utforma hälsosamma och hållbara arbetsplatser i framtiden, särskilt med fokus på sjuksköterskors arbetsmiljö. Denna kunskap syftar till att minska sjukfrånvaron, förhindra avgång från sjuksköterskeyrket, samt främja sjuksköterskornas hälsa. Den förväntade nya kunskapen stämmer överens med FN:s hållbarhetsmål i Agenda 2030, framför allt mål 3 (God hälsa och välbefinnande) och 8 (Anständiga arbetsvillkor och ekonomisk tillväxt). Resultaten syftar till att ge insikter i att främja ett hälsosamt, förlängt och hållbart arbetsliv och anställningsbarhet för sjuksköterskor inom vårdsektorn.

List of Papers

The following papers are the basis of this thesis. In the text they will be referred to by their respective Roman numerals. The papers are appended at the end of the thesis.

Paper I

Nagel, C., Westergren, A., Persson, S. S., Lindström, P. N., Bringsén, Å., & Nilsson, K. (2022). Nurses' Work Environment during the COVID-19 Pandemic in a Person-Centred Practice—A Systematic Review. Sustainability (2071-1050), 14(10), 5785. Doi:10.3390/su14105785

Paper II

Nagel, C., & Nilsson, K. (2022). Nurses' Work-Related Mental Health in 2017 and 2020-A Comparative Follow-Up Study before and during the COVID-19 Pandemic. *International journal of environmental research and public health*, *19*(23). Doi:10.3390/ijerph192315569.

Paper III

Nagel, C., & Nilsson, K. (202x). Predictors of nurses' work-related mental health during the COVID-19 pandemic – a paired follow-up study. [Submitted, under review]

Paper IV

Nagel, C., Nilsson Lindström, P., Westergren, A., Schön Persson, S., & Nilsson, K. (2025). Nurses' health and work experiences during the COVID-19 pandemic in Swedish prehospital and hospital care: a deductive content analysis through the lens of the SwAge-model. *BMC Public Health*, *25*, 304. Doi:10.1186/s12889-024-21152-x

Author's contribution to the papers

Paper I

Conceptualization. Framed the questions and the inclusion/exclusion criteria for the review with the help from the head supervisor. Performed the literature search in four databases. Quality assessment of articles with the help of the head supervisor. Individual analysis of the papers as well as comparing discussion with the head supervisor and co-authors. Original draft preparation and re-writes after discussion with co-authors and reviewers' comments. Communication with editors with the guidance of the head supervisor

Paper II

Conceptualization of the scope of the study, formal analysis with input from the head supervisor and a statistician. Original draft preparation and re-writes after discussion with co-author and reviewers' comments. Communication with editors.

Paper III

Conceptualization of the area of the study, formal analysis with input from the head supervisor. Original draft preparation and re-writes after discussion with co-author. Communication with editors.

Paper IV

Participation in project formulation including drawing up an interview guide. Contact with informants and responsible for data collection. Transcription, formal analysis and compilation of the original draft, re-writes after discussion with co-authors. Communication with editors.

Abbreviations

GRR	General Resistance Resources
JDCS	Job Demand-Control-Support
PPE	Personal Protective Equipment
PTSD	Post-Traumatic Stress Disorder
RN	Registered Nurse
SOC	Sense of Coherence
SRR	Specific Resistance Resources
SwAge	Sustainable Work environment for all Ages
WHO	World Health Organization

Preface

I became a nurse in 2002 after finishing my three years of education at nursing school at Mälardalen University in Västerås, but my real introduction to nursing came much earlier than that. Looking back, it is interesting to see that almost everyone in my family has in one way or another worked as a nurse or nurse's assistant. Growing up I would hear my mom (a nurse since 1987) talk about the ups and downs of the profession and I vowed never to be a nurse. Well, that lasted until I went on a one-year sabbatical to the U.S after graduating High School. Whilst working as a nanny, taking university courses and volunteering as a "candy striper" (hospital volunteer) I realized that I had found my calling. After all we are all products of our heroes, and in my case literally so.

Fast forward a few years I found myself working as a registered nurse in an emergency department where we had a mass exodus of experienced staff, and where I realized during a night shift about a year in that I was the most experienced nurse on duty. I began wondering why it is that some nurses leave the profession after only a few years whilst others (like my mom) work well beyond the retirement age? I never could figure out the answer since every time we (my colleagues and I) brought it up with management we were told that it was natural for nurses to want to move to other departments.

After working in the Emergency department for some time I wanted to challenge myself, so I uprooted my life and moved to Australia where I worked as a registered nurse in an Emergency department in Sydney for a few years. Even here lots of nurses left the department and/or the profession. Again, the thought of why nurses were leaving began swirling in my head. According to management it was natural for nurses to move on, but was that really the reason? And is this answer something they teach to managers around the world? When I asked the nurses, it was due to a myriad of reasons including salary and working conditions.

In 2016, I too was one of those nurses that quit nursing. For my part it was due to two doctors at the ward who made my (and other nurses) life a living hell. I am what people would call a "tough cookie" (having worked in construction you kind of had to be, especially when the boss happened to be your dad) but here I cried almost every day and dreaded having to go to work. However, I still loved the profession so when opportunity arose, I started teaching at the nursing program at Kristianstad University where I remained for several years. In those years the meetings and interactions with my students revitalized my motivation to work as a nurse and when the COVID-19 pandemic hit I went back to nursing part-time and remained as a teacher part-time.

In the fall of 2021, I saw an ad that they were looking for PhD Candidates for the project "This is why we cope! Nurses' work situation and health before, during and after the COVID-19 pandemic". I thought this is what I have been waiting for,

maybe now I can finally find the answer to my question on why nurses are leaving their workplaces and/or the profession, so I jumped at the chance, and I applied. Luckily for me I was accepted. Investigating nurses' health and work conditions is crucial for several reasons. Firstly, addressing the global nursing shortage requires us to improve work conditions to retain experienced nurses. This aligns with the UN 2030 Agenda's goals. Secondly, the work environment directly impacts nurses' overall health and well-being. By focusing on these areas, we can ensure a sustainable and healthy workforce, ultimately benefiting the entire healthcare system.

As my PhD journey nears its end, I reflect on the roller coaster of experiences—full of ups, downs, and unexpected twists. It has certainly been an interesting ride. I hope this research will spark meaningful discussions about nurses' work conditions and reach nursing associations and policymakers who can drive real change. The era of balcony applause is behind us; now is the time to take concrete action and make a difference.

A person who feels appreciated will always do more than what is expected

(unknown)

Prologue: Historical perspective

What started out in the 5th and 6th century as nuns caring for the sick and poor has progressed through time to a more medical profession. Florence Nightingale described nursing metaphorically as an art to convey that it required specialized skill, unique learning, and excellence in practice [1]. Wiederbach [2] also stated that nursing was an art since nurses help provide in whatever the patient needs. When we think about the concepts of salutogenesis and pathogenesis, we can discuss this by highlighting two iconic figures in healthcare: Florence Nightingale and Mary Seacole. Throughout my career the myth regarding Florence Nightingale has followed me like a shadow, the lady with the lamp who saw nursing as a calling. But who was she really, and why is the name Mary Seacole not as publicly known? Can we draw parallels to modern healthcare and the world we live in when we yet again face a war on the Crimean Peninsula?

Florence Nightingale

Florence realized early on that it was the nursing profession that she wanted to pursue, a not entirely respectable profession at the time. As this was not possible initially, she ended up in a deep depression in the middle of the 1840s [3]. Finally, after much effort, she was allowed to go to Germany and train as a nurse and returned to England to work. She had high-ranking friends in society and the ministry and through them she heard about the Crimean War. She was asked to go down to the Crimean Peninsula as a nurse and in early November 1854, only 20 days after she was asked to go down, she arrived with a group of nurses in Scutari [3, 4].

Florence believed that sickness or disease was nature’s way of getting rid of the conditions that have interfered with health. That it was nature's attempt to cure [5]. She noticed that soldiers succumbed to typhus, dysentery, frostbite, malnutrition and cholera and she was convinced that the dirt surrounding the soldiers caused their illnesses [3]. On arrival in Scutari, she put the nurses at work in scrubbing the walls and floors of their clinical area and she also converted one of the buildings into a laundry so that the wounded soldiers would get clean clothes and bed linens [6]. Florence emphasized the importance of a healthy environment to promote recovery and prevent disease. Her work at the Scutari hospital involved improving sanitation, ventilation, and nutrition, which are key aspects of salutogenesis. Florence believed that healthy food was one of the foundations for healthcare. She was aware that a diet without fruit led to deficiency diseases thus she made sure that the soldiers got citrus fruits. She also made sure that the soldiers got cooked meat, fixed diet kitchens for patients with special needs and hired a French chef [3]. She believed in the healing power of nature and fresh air, and her famous rounds with the lamp were not just about care but also about ensuring a clean and orderly environment.

Florence's approach also included understanding and mitigating the causes of disease. She meticulously collected data and used statistics to identify the sources of infections and high mortality rates among soldiers. Her efforts led to significant reforms in military and civilian hospitals, focusing on reducing the spread of infections and improving overall health care standards.

Moberg [3] writes in her book that judging by today's standards, it is close at hand to consider Florence Nightingale as the world's first case of burnout. That it is reasonable to think that the mass death and suffering that surrounded Florence during the Crimean War caused her immense grief and suffering. It is a strong belief among today's stress researchers that long periods with an overwhelming workload leads to a permanent hypersensitivity to stress [3]. Florence recovered mentally from her trials but rarely got out of her sick bed, she remained bedridden for almost 30 years [3]. She kept to her room and rarely allowed visitors, unless she felt her visitor could contribute to her work [4].

> "... we see how little she feels equal to anything of the kind at present. She feels quite worn out at heart and absolute quiet is all that she desires…"
>
> [Letter from Florence's sister to a friend. 4, p.281].

It is interesting that people often attribute Florences name and her calling to become a nurse as synonymous with accepting that nurses should not care about their wage. It could not be further from the truth, Florence believed that the fight for decent wages was important, that even though the work is carried out on behalf of God, it does not mean that the nurses should not be paid [3].

Florence was a prolific writer, and her writing had significant influence on hospital construction (Notes on Hospitals) and nursing (Notes on Nursing) [7]. Goldie writes that Florence's views on nursing and its organization naturally developed considerably during her period in the East and that she came to regard the welfare of the nurses as of the first importance [4].

Mary Seacole

Another important figure when it comes to nursing is Mary Seacole (née Grant) who was a British nurse and businesswoman. [8]. Seacole was born in Kingston Jamaica to a James Grant, a Scottish Lieutenant in the British Army. Her mother, nicknamed "The Doctress", was a healer who used traditional Caribbean and African herbal medicines, she also ran a boarding hall, Blundell Hall. At Blundell Hall, Seacole acquired her nursing skills, which included the use of hygiene, ventilation, warmth, hydration, rest, empathy, good nutrition and how to care for the dying. Blundell Hall also served as a convalescent home for military and naval staff recuperating from

illnesses such as cholera and yellow fever [8] Based on the West African remedies she learned from her mother Seacole began experimenting in medicine by ministering to pets before helping her mother treat humans. Due to her family's close ties with the army, she was able to observe the practices of military doctors and combined that knowledge with the knowledge acquired from her mother [9].

Seacole attempted to join the nurses in Crimea on several occurrences but was refused. Seacole questioned whether racism was a factor in her being turned down. She finally decided to use her own resources and went to the Crimean War in 1855 with the plan of setting up the "British Hotel", she opened up a restaurant/bar/catering service and also went out to the battle sites to sell food and mind the wounded soldiers [9]. Seacole's approach to health was holistic, combining traditional medicine with her knowledge of herbal remedies. She provided care that focused on the overall well-being of soldiers, including their mental and emotional health. Her establishment, the British Hotel, served as a place where soldiers could recuperate in a more homely and less clinical environment, which contributed to their overall sense of well-being.

While Seacole did not have the same focus on statistical analysis as Nightingale, she was highly effective in treating infectious diseases like cholera and dysentery, using her extensive knowledge of tropical medicine. Her hands-on approach and willingness to be on the front lines allowed her to directly address the immediate health crises faced by soldiers, thus reducing the impact of these diseases.

Both Nightingale and Seacole contributed to creating environments that promoted health and recovery, though Nightingale's methods were more systematic and data-driven, while Seacole's were more holistic and personalized. Nightingale's work laid the foundation for modern epidemiology and hospital hygiene, focusing on the systemic causes of disease. Seacole's contributions were more practical and immediate, addressing the symptoms and providing direct care. Their combined efforts highlight the importance of both preventing disease and promoting health, showcasing different but complementary approaches to nursing and healthcare.

Introduction

In the beginning of 2020, the COVID-19 pandemic hit the world hard and can be said to have been an unwelcome but natural experiment regarding the work situation within the healthcare organization. Health care organizations around the world were extremely tested and the employees paid a high price in various ways [10-13]. It is therefore important to make use of knowledge from the COVID-19 pandemic and its effects on working life, organizations and employees in order to be able to use this in the event of organizational changes and future scenarios, e.g. new pandemics. Healthcare has a shortage of employees and trained personnel, and during the pandemic the health care staff accounted for a large part of the number of sick leave cases in Sweden. Parallel to this, demographic changes are taking place in society as we have more older individuals than before who require care interventions, which means that more nurses need to be recruited. Additionally, with the increase in retirement age, people are required to continue working until they are older. A new report has shown that the working-age population in Sweden is increasing very slowly, which means further difficulties in terms of staffing [14].

Existing research often focuses on the problems, but there is a knowledge gap regarding what contributes to staff well-being in extreme work situations, such as during a pandemic when everything is pushed to the limit. It is important to find out which factors in the work environment and the work situation that relate to both physical- and mental health and illness caused by work. It is also important to make use of knowledge from the extreme strain that healthcare was exposed to during the pandemic and its effects on working life and organizations as well as on employees in different professional groups and ages, in order to be able to use this knowledge in organizational changes and future scenarios.

Background

Nurse shortage amid growing healthcare demands

The shortage of registered nurses (RNs) in Sweden is a serious and growing challenge. According to the National Board of Health and Welfare, 15 out of 21 regions report that they have a shortage of nurses, specialist nurses, radiology nurses

and other credentialed professions [15]. This shortage is expected to persist or even increase until the year 2035 [16]. Nurses are one of the largest professional groups in the Swedish labor market [17] but also account for a large part of the number of cases of work-related illness in Sweden [18-20]. Demographic changes are also taking place in society, which means that more nurses need to be recruited for care and social care when the proportion of elderly people requiring care increases in society. More nurses also need to be able and willing to work to an older age as the retirement pension is postponed due to the changing demographics [17]. There is also a shortage of trained nurses available to hire and who applies for the jobs that are vacant [17]. All too many leave the profession just a few years after graduating. Welfare's skills supply is one of this decade's most important societal challenges. Health care has a shortage of employees and trained personnel, while many leave their jobs because they don't want to or can't bear to continue working [17].

The American Nurses Foundation performed a survey with over 12 000 nurses, in that survey they identified some of the top reasons to why nurses have left or plan to leave their positions, including workplace stress, insufficient staffing, inadequate compensation, lack of trust, and inability to deliver quality care [21]. Previous studies have shown that having a lack of nurses in a hospital setting increases errors, morbidity, and mortality as well as decrease patient satisfaction [22]. When healthcare is faced with unexpected situations such as the COVID-19 pandemic, the lack of staff becomes even more apparent. Sanborn states that not having enough nurses to care for patients is a public health crisis [23].

The COVID-19 pandemic meant an extreme challenge for healthcare, and healthcare employees worldwide, not least nurses, were in a vulnerable position [24-25]. According to a study by McClellan and Chopra [26], the COVID-19 pandemic claimed over 100 000 health workers lives in its first year alone – nearly half were nurses. That nurses were at higher risk to get infected was corroborated in another study that showed that COVID-19 incidence among health workers was up to 10 times higher than in the general population [27]. Overall, in the stressful situation that prevailed during the pandemic, it is important to analyse various reasons that contribute to why some nurses leave the profession, but above all why many nurses want, and can continue to work, in other words to highlight a salutogenic perspective. Already under normal working conditions, 54% of nurses stated that their work contained many psychologically stressful circumstances [18]. In addition, 50% of nurses also indicated that they had a higher workload during the COVID-19 pandemic, which can be compared with 39% of other health and medical employees [19].

The nursing profession

Nursing has evolved over time, with the responsibilities of nurses increasing in response to the changing healthcare landscape [28]. Nursing, whilst being a rewarding occupation, is often stressful and involves substantial demands [29],

challenges including safe staff ratios, addressing burnout and moral distress [30] and in many cases also facing insufficient resources, which are risk factors for exhaustion and burnout [29]. Hence, a commitment to self-care is one way to promote the nursing staff [30]. Self-care practices can help nurses manage stress, maintain their well-being, and sustain their ability to provide high-quality care. This might include regular physical activity, adequate rest, mindfulness practices, and seeking support from colleagues and mental health professionals. By prioritizing self-care, nursing staff can better cope with the demands of their profession and continue to thrive in their roles.

RNs are the largest group of health professionals globally [28,31], accounting for approximately 59% of the health professions [31] and thus playing an essential role in the delivery of quality healthcare. RNs are an important professional group that supports much of the welfare in society, and in healthcare, nurses are the centre for nursing and patient care [32]. Nurses play a pivotal role in health promotion and in responding to society's health needs [31]. At the same time, nursing is a profession that belongs to the "contact professions", which are particularly exposed to stress in their work situation where they are the ultimate link that implements political decisions while at the same time caring for the sick and needy [32]. However, being a contact profession also has its benefits such as the opportunity to provide a sense of purpose and to be able to contribute to others' lives. Nursing can also be a source of personal identity as well as provide a sense of a complex competence [33].

One definition of the complex nursing competence is that it "integrates the art and science of caring and focuses on the protection, promotion, and optimization of health and human functioning; prevention of illness and injury; facilitation of healing; and alleviation of suffering through compassionate presence..." [34]. If we look at the quote below from Mirsch one could say that nursing is, if not art, then at least multidimensional.

> "Being a nurse is admittedly no longer a calling. but there are characteristics and a view of humanity that are common to those who choose the profession. Above all, I would like to say that they are all genuinely interested in other people. The meeting with the patients, being able to help others, even save lives, or be the one who ensures that death becomes dignified, is what makes their work meaningful. in the worst moments of your life, they always do their best. Around the clock, 365 days a year"
>
> [35, p 6].

According to the competency description for RNs in Sweden, the registered nurse must have independent nursing responsibility for good and safe care, which means being able to work proactively, risk-aware, patient-safe and comply with regulations. Safe care is one of the six core competencies and form a basis for all nursing which is ensured through the other core competencies: person-centred care, collaboration, evidence-based care, improvement knowledge for quality

development and informatics [36]. All of this requires a supportive and stable work environment for nurses.

Research highlights that the work environment of nurses significantly influences the quality of nursing care [37-38]. A high-quality work environment is essential for ensuring excellent patient care [39-40]. According to Damschroder et al. [41], the work environment is the internal setting of an organization where employees operate. In a positive work environment, nurses have autonomy, control over their practices, and feel valued, respected, and safe. They also experience physical comfort, multidisciplinary collaboration, open communication, and opportunities for career advancement [42]. Furthermore, a favourable work environment is one where nurses are respected and valued for their professionalism [43]. A decent working environment is a prerequisite for patient safety and that the care maintains a good quality. One of the sub-goals of the Public Health Policies in Sweden emphasizes the importance of protecting workers' rights and promoting a safe and secure working environment for everyone [44]. Work environment is a complex area that includes both psychosocial and physical conditions in the workplace. A good work environment is the result of several factors working together, including demands, control, reward, fairness, leadership, communication, influence, social support, work-life balance and the right skills. These factors can affect health and well-being both positively and negatively [45]. Working life should be characterized by safety and security in physical, psychological and social terms [46].

Working environment conditions are particularly important for the mental health of healthcare workers [47]. A salutogenic perspective on the work environment means that the development of both individuals and organizations is linked. The type of organization affects the employees and their work [48]. According to Kanter [49], a work environment that gives employees access to information, resources, support and opportunities means that they feel empowered and in control at work. Good structural empowerment leads to organizational efficiency and people feeling secure in their work.

Nurses coping strategies and empowerment

Coping is about a sense of control and empowerment [50]. Coping involves the thoughts and behaviours that individuals use to handle both internal and external stressors [51]. Those with strong emotional coping skills can manage unpleasant situations without experiencing excessive stress. People may perceive events differently and use multiple coping strategies to address challenges [52]. These strategies include positive thinking, distraction, avoidance, denial, seeking social support, and problem-solving [53]. Coping strategies are generally categorized into two types: (1) Adaptive coping strategies, such as acceptance, and (2) maladaptive coping strategies, such as self-blame [54]. The salutogenic approach emphasizes the development and maintenance of individuals' health, highlighting how people can draw strength and energy from savouring positive life experiences [48,55].

Implementing effective coping strategies for emotional regulation can help nurses avoid the exhaustion of their emotional resources [56].

Empowerment can be seen as a framework with central concepts such as (own) power, (own) control, self-confidence, pride, participation and knowledge. Previous research has shown that structural and psychological empowerment were closely linked to nurses' work motivation and occupational mental health [57]. One central aspect of empowerment is the idea that knowledge and insight are important resources for motivation to make health-related changes [58]. Empowerment could be seen as synonymous with (positive) health. In other words, to be healthy is to be empowered, having power of the own situation, their work tasks and their close environment. Alternatively, empowerment could be seen as instrumental – that is, as a means to achieving (positive) health [59]. Empowerment and resilience are closely linked concepts that often reinforce each other. Research indicates that when individuals feel empowered, they are more likely to develop resilience because they have the confidence and resources to face challenges and bounce back from setbacks [60].

Nurses' resilience and flourishing

One definition of resilience is that it is a combination of attitudes and skills that can help people cope with their feelings and functions after a traumatic incident has impaired their ability to cope [61]. Individuals' resilience can decrease in the event of various traumas, e.g. in the event of illness and injury but also in the event of a reorganisation of work [62]. A good resilience interacts with a good sense of coherence (SOC), i.e. an experience of existence as manageable, meaningful and comprehensible. Having a good resilience aims at a good resistance and a good buffer position for impact and change, at adaptability when the system has lost its equilibrium position and at the ability to turn problems and disturbances into opportunities and innovative thinking [62]. In response to the increasing pressures facing nurses working within overstretched and under-resourced healthcare systems, building personal resilience has been identified as being essential in coping with work related stress and adversity, maintaining job satisfaction, and engaging in self-care [63].

The concept of flourishing, which can help us understand the deeper aspects of positive workplace relationships, has been explored by several authors in recent years. Initially, it focused more on individuals, describing the state achieved when one reaches the highest levels of functioning and psychosocial health [64]. Seligman (2012) also highlighted individual well-being as essential for flourishing, identifying relationships as one of the key elements. He outlined five essential elements of well-being necessary for flourishing: positive emotions, engagement, relationships, meaning in life, and accomplishment (PERMA) [65].

Work is a common daily context for many, and previous research has applied the concept of flourishing to the workplace. They found that workplace relationships

are crucial for promoting employee flourishing. These relationships foster personal growth through friendship and the opportunity to help others. Positive workplace relationships also enhance job satisfaction, feelings of meaningfulness at work, and overall life satisfaction, benefiting both individuals and organizations by fostering flourishing [66-67]. In order to create the conditions in the workplace for employees to be able to cope and handle different situations, flourish in competence and feel good at work, workplace health intervention is needed.

Workplace health promotion and prevention

Working environment and working conditions are linked to the UN Agenda 2030 and the global goals, especially goal 8 which deals with decent working conditions and economic growth. A good work environment contributes to health and well-being, while a poor work environment can increase the risk of ill-health. For example, high demands and low control at work can lead to an increased risk of depression [68]. The aim of the Work Environment Act (1977:1166) is to prevent ill health and accidents and to create a good working environment, which means more than a neutral working environment – it is about an environment that has positive effects on the individual. A "healthy workplace" is a workplace with a work environment that benefits both the individual and the business [45]. This perspective is supported in theories about salutogenic health-promoting work [69] and in theories about salutogenic health-promoting workplaces [70].

Workplace health intervention and prevention involves enabling individuals to manage and enhance their health at work [71]. Effective strategies for promoting health in the workplace include identifying the specific health needs and interests of employees, creating a structured plan that encompasses health-related programs, policies, and environmental changes, and encouraging physical activity by providing fitness facilities, organizing group exercise sessions, or offering incentives for staying active. Workplace health interventions can be approached from two perspectives: a salutogenic perspective, which involves identifying and strengthening aspects of the work environment that promote employee health and well-being [72-73], and a pathogenic perspective, which focuses on identifying and reducing risk factors that can cause illness and injury in the workplace [74]. The pathogenic perspective has traditionally dominated workplace health research, emphasizing work-related disease risks [75]. In contrast, the salutogenic approach emphasizes work-related health resources, regardless of potential morbidity [69-70].

Vaandrager et al. [74] define workplace health as the ability to participate and be productive in a sustainable and meaningful way. A salutogenic approach to workplace health promotion aims to create conditions that empower employees to manage their health and identify work-related health factors [76-77]. The specific resources needed can vary depending on the workplace and job tasks [72,78]. In healthcare, it is vital to identify and strengthen resources that resist stress [48,79],

enhance health [80], and address work-related “push and pull factors” [81], as well as factors that help nurses thrive professionally [82-83]. For instance, relationships among colleagues, managers, and care recipients are crucial resources in healthcare [84-86]. The salutogenic perspective focuses on health and which resources, processes and factors can strengthen and sustain health. In connection with this, Antonovsky introduced the concept of SOC. It represents the individual's resilience and coping skills, and is achieved when life is experienced as meaningful, comprehensible and manageable. Antonovsky focuses on the person's resources and claims that people who have resources and SOC as an approach are better able to deal with health-related difficulties than those who focus on illness [50]. In the salutogenic model, health is considered as a position on an ease and dis-ease continuum, instead of positioning health and disease opposite to each other, i.e. dichotomy which is mainly the feature of the pathogenic model [87].

In addition to the core concepts of SOC, it’s important to consider two other key concepts: Generalized Resistance Resources (GRRs) and Specific Resistance Resources (SRRs) against stress [48, 79]. A GRR is a generality, and an SRR is a particularity or context bounded [80]. Antonovsky's theory of salutogenesis identifies various coping resources that can promote the ability to cope with stress in difficult situations. The higher the degree of resistance resources the person and the environment have and can use, the higher the SOC and the higher the degree of health the person will experience [48]. GRRs are factors like identity, money, and social support that help individuals cope with stress. Antonovsky identified these as essential for creating conditions that make life experiences consistent and understandable. These resources help individuals and groups, such as nursing teams, develop a strong SOC. Examples include material resources, knowledge, social support, and cultural stability. SRRs are context-specific resources that help individuals manage particular stressors [88].

Employees use combinations of GRRs to handle stressors. For instance, the ability to distance oneself from emotionally challenging situations is crucial in professions involving patient care. Planning breaks, managing challenges, and experiencing a supportive social climate are important for maintaining control and motivation at work. Positive work experiences, such as humour and joy, enhance employees’ SOC by making stressors more manageable. Identifying and utilizing work-related SRRs can further strengthen SOC through understanding and appreciation of positive work processes. In workplace health promotion, it’s important to focus on factors that contribute to employees’ SOC and to address stressors positively [72]. Positive work experiences are seen as health resources that foster self-efficacy and growth. Previous studies highlight the significant impact of the workplace on employees’ health and well-being [89-91]. But we cannot ignore the fact that the workplace also has straining and stressful aspects and thus the pathogenic perspective also needs to be considered in parallel with the salutogenic one. They complement each other based on the different perspectives on health. It

is therefore essential to identify both workplace problems and specific positive factors that contribute to workers' health [76, 92].

Health as a concept

The concept of health is still evolving, and which domains or important aspects are included in the concept of health is still debated. Health can be described in broad terms such as "ability to act" which I argue has a more functional approach to health, including physical, mental, emotional capability and the adequate resources to act. The term well-being is also used to describe health and is more holistic in its meaning, incorporating both the mental and physiological aspects of health as well as being more subjective [93].

In the traditional disease-oriented (pathogenic) model of health, the focus is on causes of disease. The emphasis of the pathogenic approach is on understanding the causes and consequences of disease, rather than understanding the factors that promote health and healing [48, 87]. Accordingly, the disease control strategies target these causes e.g. smoking, overweight and so on [87]. Today's perception of health is strongly influenced by medical science. Modern medicine has contributed to a more scientific and technical view of health, where the focus is on biological and physiological aspects as well as on the prevention and treatment of diseases. Good physical health is the basis for strong mental health, as body and mind are inextricably linked and positively influence each other. But despite this strong connection, many can still experience mental illness, which shows how complex and multifaceted our mental health is. Mental ill-health can be expressed in terms of not feeling well. It can be about an imbalance in existence that can express itself in feelings such as worry, anxiety, inadequacy or even feelings such as meaninglessness and helplessness [94].

Health can be seen in a subjective or objective perspective. Objective health can, for example, be assessed based on blood values and physical function, while subjective health can be assessed based on how a person feels [95]. Eriksson [96] believes that the individual's subjective experience of health varies from moment to moment and that it is strongly anchored to the individual's current situation. One of the biggest watersheds regarding health seems to have been whether to include well-being in the concept, some like Nordenfelt [97] stated that well-being could not be included in the definition of health whilst Brülde [98] stated that it must be included. Maeland [99] states that health as well-being is close to the definition of quality of life, and health as a resource can be a prerequisite for quality of life, and vice versa. Regardless of the content one puts into the concept of health, it is decisive for how healthcare professionals relate to patients. Eriksson [100] believes that health is an overall state characterized by soundness and well-being, but not necessarily by the absence of disease. This means that well-being is central and therefore possible to achieve even in connection with illness.

Historically, health has been viewed as the opposite of disease, a perspective known as the medical model [101] or the biomedical model [102]. This view was prevalent throughout human history but faced criticism for its narrow focus, excluding mental and social aspects [101]. The social model gained prominence with the adoption of the World Health Organization's (WHO) constitution in 1948, which defined health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" [103]. This broader definition integrates mental and social well-being into the concept of health. Consequently, health is no longer simply the absence of disease; rather, disease is considered one component of overall health. This also applies to the concept of illness, which refers to a person's subjective experience of disease [102]. Illness is a part of health but does not solely define it. A person can feel ill despite having a minor pathology, good mental well-being, and a rich social life, and thus be considered relatively healthy.

Throughout history, the concept of health has been deeply rooted in religious, philosophical and ethical ways of thinking. These perspectives have shaped how people have understood and valued health. The concept of health early on represented a general idea, formulated by Hippocrates in 400 BC, that human well-being is affected by lifestyle, climate, air quality, water and nutrient supply, and is a result of harmony between bodily conditions, environment and lifestyle [104]. Thus, if a person experience imbalance the feeling of stress most often appears.

Stress and work-related stress

In the 1950s, Hans Selye introduced the concept of 'stress' in the field of biology. Stress can be understood in various ways: as a stimulus, a response, or an interaction between an individual and their environment [105]. Numerous studies have shown that stress can negatively impact health through both direct neuroendocrine pathways and indirect pathways mediated by health behaviours. Substantial evidence indicates that stress can affect all bodily systems [106-107] and is linked to the development or worsening of a wide range of physical and mental health issues, including cardiovascular disease [108], diabetes [109], autoimmune diseases, anxiety, and depression [110]. Work-related stress, in particular, is associated with numerous health problems such as heart disease, stomach ulcers, migraines, and mental disorders. These health issues have significant repercussions on employees' organizational behaviour, as well as their personal and family lives, leading to considerable economic and social costs [111-112].

The term "stress" is commonly used in everyday language, often to describe the discomfort caused by various life situations. When people refer to stress, they typically mean the stimuli that have caused changes in their lives and triggered a stress response, although these stimuli are not always inherently negative. Stress should not be viewed solely as a negative condition that must be combated. In moderate amounts, stress can stimulate action, help focus attention and facilitate

decision-making. However, when stress persists for too long, it can lead to decreased efficiency and productivity [113-115].

It is crucial to distinguish between positive or beneficial stress (eustress) and negative or harmful stress (distress). When an individual's body mobilizes to take action, resulting in effective and rational performance, they experience eustress. This positive form of stress is characterized by high levels of motivation. With adequate social and psychological resources, a person can harness eustress, a beneficial type of psychological stress that enhances focus and boosts performance [116]. Eustress not only helps individuals tackle challenges more efficiently but also contributes to their overall well-being by fostering a sense of accomplishment and resilience. Conversely, when stress becomes excessive, it can lead to heightened emotions, disintegration of actions and behaviours, and ultimately exhaustion. In the nursing profession, stress has long been associated with various challenges such as physical labor, shift work, exposure to human suffering, interactions with other staff, and interpersonal relationships [117]. Work-related stress and other health-related aspects needs to be considered for nurses' working life to be sustainable.

Sustainable working life from the SwAge model

One model which is used as both a theoretical framework and as a practical tool to improve the working environment and working conditions for employees of all ages is the SwAge-model [62, 118]. The SwAge model, which stands for Sustainable Working Life for All Ages, is a theoretical model that aims to create a sustainable working life for people of all ages. The model was developed to meet the challenges that arise in working life due to the demographic change, where people live longer and thus work longer. The SwAge model operates on three levels:

1. *Individual level*: Focuses on the individual's health, motivation, and skill development throughout the entire working life.
2. *Organizational level*: Addresses how employers can create an inclusive and supportive work environment that considers the unique needs of employees depending on age.
3. *Societal Level*: Looks at the wider societal factors that affect working life, such as legislation, social norms, and economic conditions.

The SwAge model (Figure 1) identifies nine key areas that are crucial for a sustainable working life for people of all ages. These areas are linked to four main aspects of employability, which include the ability and willingness to participate in the workforce. The four aspects (spheres) and nine key areas (determinant areas) are (Table 1):

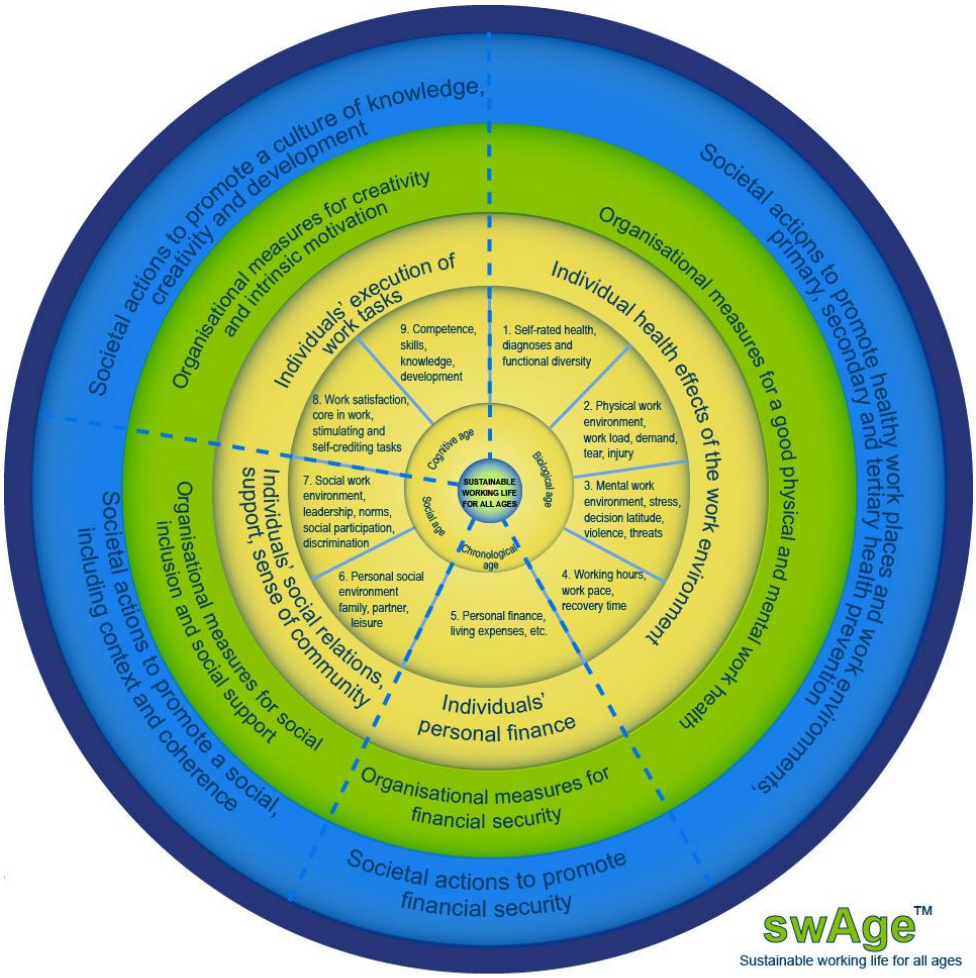

Figure 1. The SwAge-model that shows the four spheres and nine impact areas for a sustainable working life [62, 118].

Table 1. Influencing and determining factors for a healthy and sustainable working life

Area	Meaning	Sphere
1.Self-rated health	Includes diagnoses, self-rated health and various physical and mental health functions at work.	Health Effects of the Work Environment: Adequate health is essential for employability and inclusion in the workforce. Work life impacts biological aging, mental and physical health, and the need for recovery due to physical and mental stresses, but it also has strengthening effects.
2.Physical work environment	Involves repetitive movements, heavy lifting, accident risks, climate, chemical exposure, and contagion risks.	
3.Mental work environment	Covers stress, balance of mental demands and own control over the work situation and threats-, and violence at work.	
4.Working hours, pace and recuperation	Considers the possibility of recuperation during and between work shifts.	
5.Personal financial situation	Affects individuals' needs and willingness to work. Financial incentives are managed by society through systems like social insurance.	Personal finance: Health issues, lack of skills, and insufficient support can lead to exclusion from the workforce and a poorer financial situation, such as through sick leave, unemployment, and early retirement, especially during tough times. The organizations and workplace finances determine the tools and techniques available to create a more sustainable work environment, enhancing long-term employability.
6.Personal social environment	Includes family, friends, and leisure activities.	Relations and social support: Every individual has and need relations. Employees have a personal life and a work social environment. Leadership, workplace norms, social support, inclusion in the social group, as well as neglect, bullying and discrimination are aspects that can influence individuals opportunities and willingness to work.
7.Social work environment	Involves leadership, discrimination, and the significance of the employment relationship context for individuals' work.	
8.Motivation and satisfaction:	Relates to individual and instrumental support, including motivation, appreciation, satisfaction, and stimulation in work tasks.	Execution of work tasks: Effective task execution relies on both individual and instrumental support. Strong individual support makes people feel valued and capable, enhancing their performance. Instrumental support provides the necessary resources for efficient activity completion. Together, these supports improve performance and satisfaction.
9.Knowledge and competence:	Emphasizes the importance of competence development for the individual's work.	

Rationale

The findings of this thesis aim to enhance our understanding of what enables a healthy, prolonged, and sustainable working life for nurses in the healthcare sector. By addressing the challenges and work environment issues highlighted by the COVID-19 pandemic, we can improve conditions for nurses. This proactive approach will better prepare us for future pandemics or significant changes, ensuring a more resilient and adaptable healthcare workforce.

Aim

The overall aim of this doctoral project was to explore nurses' work situation and health before, during and after the COVID-19 pandemic, with a special focus on work-related mental health.

The specific aims were:

I. To identify and analyze the state of knowledge regarding nurses' work situation, health, and person-centred work during the COVID-19 pandemic through a systematical review. The aim was also to identify any knowledge gap regarding the nurse's work situation with importance to their own health and to better person-centred health and medical care.

II. To investigate the association between work-related mental-health diagnoses and different factors in nurses' work situations before and during the COVID-19 pandemic.

III. To investigate predictors of work-related mental health problems in nurses' work situations through paired follow-up with nurses who had developed work-related mental health problems between 2017 and fall/winter 2020.

IV. To explore factors and processes that affected health and work experiences among nurses in Sweden during the COVID-19 pandemic.

Methods

Study design and overview

This thesis has followed an explanatory sequential design of mixed method where the initial study (**I**) was the base of the project, the emphasis was on the quantitative phase (study **II** and **III**) which was then followed by the qualitative phase (study **IV**) [119]. The findings from the quantitative studies were instrumental in shaping the questions included in the interview guide for the qualitative study. This approach was adopted to provide a comprehensive explanation and to gain a deeper understanding of the quantitative findings. By integrating insights from the quantitative data, the qualitative interviews were designed to explore underlying factors, contextual nuances, and nurses' experiences that could not be captured through quantitative methods alone. This methodological synergy ensured a more holistic analysis, allowing for richer, more detailed interpretations of the data. The timeline of the project is illustrated in figure 2.

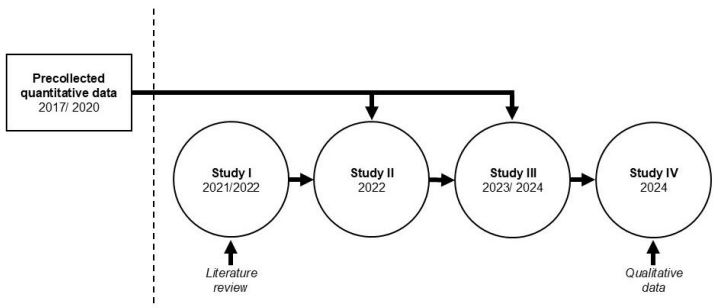

Figure 2. Timeline of the datacollection, and progress of the studies in this thesis

The research comprised four studies: two were quantitative and longitudinal, while the other two were qualitative. The initial phase involved collecting qualitative data to gain a foundational understanding of the research area. This was achieved through a qualitative systematic review, where findings from various studies were synthesized to interpret and integrate themes, concepts, and insights, providing a deeper understanding of the phenomenon under investigation (Study **I**). Following

this, quantitative data were extracted from previously collected surveys from a cohort of nurses to examine relationships and causal effects (Studies **II** and **III**). This approach allowed for the identification of patterns and trends over time, contributing to a robust analysis of the data. In the final study (Study **IV**), the aim was to further explore and understand the nurses' experiences through a interview study. This method provided rich, detailed insights into nurses' personal and professional lives, complementing the quantitative findings and offering a comprehensive view of the research topic (Table 2).

Table 2. Overview of the four studies in this thesis

Study I.	
Aim	To identify and analyze the state of knowledge regarding nurses' work situation, health, and person-centred work during the COVID-19 pandemic through a systematically review. The aim was also to identify any knowledge gap regarding the nurse's work situation with importance to their own health and to better person-centred health and medical care.
Study design	Qualitative design. Systematic literature review.
Data collection	Literature review
n	15 articles
Analysis	Systematic literature review with meta-syntesis
Study II.	
Aim	To investigate the association between workrelated mental-health diagnoses and different factors in nurses' work situations before and during the COVID-19 pandemic.
Study design	Quantitative design. Longitudinal study, 2017 and 2020.
Data collection	Questionnaire
n	4692 informants (2017), 3107 informants (2020)
Analysis	Logistic regression analysis, MANOVA.
Study III.	
Aim	To investigate predictors of work-related mental health problems in nurses' work situations through paired follow-up with nurses who had developed work-related mental health problems between 2017 and fall/winter 2020
Study design	Quantitative design. Longitudinal study, 2017 and 2020.
Data collection	Questionnaire
n	143 informants
Analysis	Logistic regression analysis
Study IV.	
Aim	To identify the salutogenic and pathogenic factors that influence nurses' health and work situation related to the COVID-19 pandemic in Sweden.
Study design	Qualitative design.
Data collection	Semi-structured interviews.
n	14 informants
Analysis	Deductive content analysis

Context

Like many other countries, Sweden faced significant challenges due to the COVID-19 pandemic. However, unlike most nations that implemented strict lockdowns, Sweden opted for a different approach. The Swedish government chose to rely on voluntary measures rather than enforcing a full lockdown. This strategy aimed to balance public health concerns with the preservation of personal freedoms, allowing Swedish citizens to maintain a degree of normalcy and autonomy during the pandemic [120]. This unique approach sparked considerable debate and analysis, both within Sweden and internationally, regarding its effectiveness and impact on public health and society. In retrospect, we can observe that despite the high death rates during the spring of 2020, the overall excess mortality in Sweden for the years 2020-2021 was lower than in many other European countries [120].

Pre-collected data: sample, procedure, and data collection

This PhD project was a part of a bigger ongoing research project, "Sustainable working life for all ages" and through this project the survey data was obtained for the second and third study. The cohort for the second and third study were nurses that were employed in the Region of Skane in 2017 and 2020 (total selection), the majority of informants in study **II** and **III** were women, and the median age was 48 (2017) and 52 (2020). A majority (73.3%) of the informants (nurses) in 2020[1] worked in hospitals, 14.1 % worked in primary care, 6.2 % worked in psychiatry and habilitation and 6.4 % worked in other areas (such as ambulance services, advanced healthcare in the home or 1177 helpline).

Qualitative studies

Study I and IV: Sample and data collection

In the first study (**I**) a systematic literature review was conducted to identify knowledge gaps. Through searches in four databases, 15 articles that matched the inclusion criteria was found. The articles included research from Sweden, the US, Greece, Japan, South Korea, Turkey, Italy, Spain, Brazil, India and the Netherlands. In the fourth (**IV**) study semi-structured in-depth interviews with nurses from southern and central Sweden that worked in hospital and pre-hospital settings, who came into contact with patients who had COVID-19 were conducted. Snowball sampling was used to get variations of the informants' experiences and background.

[1] This data was not obtained in the 2017 questionnaire.

The informants worked in ambulances, in emergency departments, in infection wards, in intensive care units or in specialized COVID wards. Half of the informants had a diploma in nursing in their specialty.

Literature review (study I)

In the beginning of the project, the research team sat down and formulated the research question and which inclusion and exclusion criteria for the articles that were eligible for the study (**I**). To optimize the search field, four databases was selected for the literature search. The method employed in this investigation was a systematic literature review, conducted in several steps following the guidelines outlined in the Cochrane Handbook for Systematic Reviews [121]. The PRISMA guidelines [122] were adhered to as well as the five steps for conducting a systematic review as described by Khan et al. [123]. The literature searches were carried out by researchers Nagel and Nilsson in the following electronic databases: CINAHL, PubMed, Medline, and Scopus. Relevant articles were identified through a multi-step process. Initially, each database was searched using five key terms: person-centred, work environment, organisation (or organization to include both British and American spellings), nurse, and COVID-19. These keywords were combined using Boolean operators (i.e., AND, OR). During the search, it was discovered that combining all the keywords with "person-centred" yielded no findings, which led to the exclusion of this particular keyword from the search.

*Interview guide (study **IV**)*

The interview guide was based on the SwAge model [118] consisting of nine determinant spheres of a sustainable working life for all ages, SOC [50] as well as based on the findings from studies **I-III**. The interview guide was discussed by the authors and agreed upon. Before my halftime assessment I conducted three pilot-interviews in order to be able to discuss this study with the halftime assessors. Based on the discussion with them and then later on my supervisors, small adjustments were made to the interview guide e.g. starting with the question "What were your feelings when you first heard of the COVID-19 pandemic?".

Procedure

The data collection for the literature review (study **I**) was carried out from November 2021-beginning of February 2022. The systematic review was performed in accordance with the literature review guidelines in the Cochrane Handbook for systematic reviews [121] and the PRISMA guidelines [122].

The semi-structured interviews (study **IV**) took part in May-June and from October to November 2023 and were performed by me. According to Polit and Beck [124] interviews are the main data collection method that is used in qualitative research. A semi-structured interview guide (appendix 1) was used in each interview. The interviews were conducted at a place chosen by each of the

informants. A majority of the interviews were performed in a room adjacent to the informant's place of work. Two interviews were conducted in a secluded room at a coffee shop and a few of the interviews took place in a separate room in a nearby library. Prior to the commencement of the interviews, the informants were reminded that participation in the study was voluntary and informed that the authors would adhere to the rules of GDPR [125]. When the informants stated that they felt that they had been given proper information they signed an informed consent.

The interviews started with questions about the informants' background before they were asked to describe their initial thoughts and feelings when hearing about the COVID-19 pandemic. Follow-up questions were then asked depending on what the informant discussed, and the interview guide was used as a checklist to ensure that we covered all the interesting areas of the study. All interviews ended with the question: Is there something that we have not discussed that you would like to address? This gave the informants a chance to talk freely. The time for each interview differed between 64 and 119 minutes.

Quantitative studies

Study II and III: Sample and data collection

Data used in study II and III was pre-collected data, see description under heading "Sample, procedure, and data collection pre-collected data" above.

Questionnaires

A link to a web survey was sent out via work e-mail to all employees in the Healthcare sector in the Swedish region of Skane. The questionnaires were designed by Professor K.N and based on the SwAge model, her previous research [126-128] and the Demand-Control questions by Karasek and Theorell [129]. The questionnaire has been used and validated in other surveys [130-131]. The questionnaire is extensive and touches on, among other things, the willingness and possibility of the staff to work to an older age, their self-rated health, whether they felt they had suffered any illness or injury caused by work. In total the 2017 questionnaire contained 158 questions, and the 2020 questionnaire contained additional COVID-specific questions (n=41). The data for 2017 was collected between March and April, and the data for 2020 was collected between early September to mid-December. In study **II** and **III** the focus was on the nurses that replied to the questionnaires.

Procedure

In early 2022, I was given access to some of professor Nilssons data from the greater research study in order to be able to decide which data to focus on in the second and third study. Although most reported injuries/illnesses were musculoskeletal, the choice fell on the mental health aspect of the data (i.e. ICD-10 codes: depression, anxiety, stress and exhaustion). In total, 24 statements were chosen from the original data. The nurses filled out whether they had a self-reported diagnosis that they attributed to their work situation. Another option could have been to use register data; however, it is known that the data regarding work-related injuries/diseases are underreported. Singh-Manoux et al [132] states that self-rated health can be a better predictor of mortality than diagnosed disease.

Analysis

Qualitative analysis

*Study **I***

In study **I**, the objective was to integrate and interpret data from the 15 included studies to gain a deeper understanding of the research. To achieve this, a systematic literature review with meta-synthesis was conducted. The review process followed several steps as outlined in the Cochrane Handbook for Systematic Reviews [121]. Additionally, the PRISMA guidelines [122] and the five steps for conducting a systematic review described by Khan et al. [123] were adhered to.

The first step involved framing the questions for the review, followed by identifying relevant articles. A list of criteria (inclusion and exclusion) was established to enhance validity and limit the search to the most pertinent articles for this investigation. The included articles were initially thoroughly assessed for quality by researchers C.N and K.N, and then individually analysed through deductive content analysis inspired by Lindgren et al. [133]. Subsequently, all authors compared and discussed the findings to sort the collected data into the predefined categories (the nine determinant areas of the SwAge-model).

*Study **IV***

In study **IV**, all interviews were transcribed verbatim and was pseudonymised by me. Each interview was given a random number between 1 and 14. The transcripts were initially read several times by all authors to get a deeper understanding and a full picture of the informants' opinions. Two of the project members approached the analysis from a deductive point of view while the other three looked at the inductive perspective. The analysis was inspired by Elo and Kyngäs [134]. From the text, meaning units were condensed into codes such as workload and support, the codes

that belonged together were compiled by all authors in groups and these were coordinated in pre-determined themes and subthemes (i.e. the nine determinant areas of the SwAge model). The transcripts were read a final time to ensure that all the relevant material was covered in the subthemes and themes. Since the interviews garnered rich data, it was decided to take a part of the data (regarding nurses' thoughts on and opportunity to use person-centredness during the pandemic) and make a separate study with that material (hence it is not included in this thesis).

Quantitative analysis

*Study **II** and **III***

In both study **II** and study **III**, logistic regression was employed to analyse the data. Additionally, in study **II**, a Multivariate Analysis of Variance (MANOVA) was also utilized to determine whether the observed mean differences among groups (i.e., between 2017 and 2020) across multiple dependent variables were statistically significant or likely to have occurred by chance. All statistical analyses were conducted using SPSS software.

Logistic regression is a powerful statistical method used to model the relationship between a binary dependent variable and one or more independent variables. It helps in understanding the impact of various predictors on the likelihood of a particular outcome. MANOVA, on the other hand, is an extension of ANOVA that allows for the simultaneous analysis of multiple dependent variables. This method is particularly useful when researchers are interested in examining the effect of independent variables on a set of related dependent variables, providing a more comprehensive understanding of the data. By employing these statistical techniques, the studies aimed to rigorously evaluate the data and draw meaningful conclusions about the relationships and differences observed in the research.

Ethical considerations

All studies were performed in accordance with Swedish laws [135] and approved by the Swedish Ethical Review Agency (number 2016/867 and 2020-01897). Rules for the handling and storage of data was and will be followed in accordance with university policies as well as guidelines for handling sensitive data according to GDPR [125]. All studies in this thesis were also performed in accordance with the Helsinki declaration [136]. One of the most fundamental principles in the declaration is that the care of the individual should be at the centre, that is to say come before the interests of both science and society. The ethical guidelines include that the researcher must have obtained informed and voluntary consent to partake in the study (**IV**) from the informant. It is therefore important for the researcher to make sure that the informants understand the purpose, risks and benefits of the research.

In regard to the studies and informed consent one can argue that even though the informants for the studies where we used the data from the questionnaires (Study **II** and **III**) did not sign an informed consent, they did consent to the study and therefore to us using the data by answering the questionnaires. Both in the information letter and in the survey, it was made clear that they approved participation by answering the survey. In the interview study (Study **IV**) both written and oral information were given to the informants before the interviews took place and they also signed an informed consent form. The informants were also informed several times before the interview that they had the right to withdraw from the study at any time without having to give a reason. The informants have a right to privacy and confidentiality, in study **II** and **III** their personal information is protected through several steps. A project-specific running number was created for each individual. Code keys for e-mail addresses and social security numbers have and will be kept separate from the coded material. The code key to the project-specific running number, social security number and e-mail addresses are stored on a separate encrypted hard drive and kept in a locked security cabinet in a room located in a locked corridor at Lund University. There has been no direct contact between the researchers and informants in study **II** and **III**. The web survey responses submitted by the informants were automatically compiled via the web survey tool SunetSurvey into a database in Excel. In the database, only the project-specific serial number is visible together with the survey responses. In regard to the interview study (Study **IV**) only I know the identity of the informants, the other authors of that study were given general characteristics (i.e. gender, age, civil status, years in the profession etc.).

In all the studies, the harm to informants was minimized and this was especially important in the interview study (Study **IV**) where questions of a sensitive nature were asked. The informants were informed before the interviews took place that if they felt uncomfortable answering the questions they could relay that to the interviewer and that question would be left out, none of the informants chose to opt out of answering any of the questions. Benefits were weighed versus harm, and it was concluded that the benefits (the knowledge) this study would generate was considered to outweigh the potential risks that the study could bring. For the interviews it was also important to let the informants choose the venue for the interview so that they would feel comfortable, this was also a way to respect their autonomy.

All informants were treated equal with respect and fairness regardless of gender, age or other factors. Initially there were discussions in the research group whether the first author should perform the interviews with one of the supervisors in attendance, due to that the informant had ended up in a power disadvantage with two against one, it was decided that only the first author performed the interviews (Study **IV**).

In the interview study (Study **IV**) there was a potential of role conflict as well as difficulties in maintaining a professional distance as the person conducting the interviews had the same occupation (i.e. nurse) as the informants. It was therefore important to maintain objectivity, consequently the interviewer asked follow-up questions and questions to clarify the informants' answers when they used specific terms and expressions that could be subject for interpretations.

One aspect that one may not often think about is what ethical benefits one can see in the studies. In what way do the experiences of the informants (surveys/interviews) affect themselves, but also others? After I had completed the interviews (Study **IV**), some of the informants have emailed me and said that with the interviews they have been able to process some of what they have been through. Maybe then others can be helped by reading about this and feel that they were not alone in feeling a certain way.

Preunderstanding

The fact that I am a nurse cannot be ignored, so therefore this must be taken up with forethought. I have experience from having worked clinically as a nurse, both in Sweden and other parts of the world, in everything from municipal care to being active in my specialist area of Anaesthesia Nursing. I have worked clinically during epidemics such as the swine flu and SARS but also during the COVID-19 pandemic.

Before conducting the interviews for study **IV**, I chose to be interviewed by one of the co-authors, partly to test the questions (whereby we made some adjustments) but above all to make my own thoughts and opinions visible. My understanding is that the nurses who were interviewed felt that they could relax when I told them that

I was a nurse and that I myself had worked clinically during the pandemic. However, I was very conscious of not letting my own experiences control the questions that were asked (i.e. leading questions) and that I asked questions when they expressed words where I could understand the meaning but where I wanted to make it clear that it was their experiences and not my interpretation of it. The following questions, based on an article by Palmér et al [137], were reflected on during the transcription and analysis phases:

1. Does my interview technique include many leading questions? Am I influencing the interviewee's answers in any other way?
2. Have I asked follow-up questions that do not align with the research phenomenon because I misunderstood the informant's description?
3. Have we added or omitted anything during the analysis process? If so, how have our prior understanding influenced this?

During the doctoral studies, discussions took place continuously with my supervisors to ensure that the boundary between researcher and nurse was maintained.

Findings

The aim of this thesis was to explore nurses' work situation and health before, during and after the COVID-19 pandemic. The findings show that many nurses were reassigned to different roles, often against their will. They experienced a lack of control over their schedules, frequent last-minute changes, and increased working hours, which led to stress. Despite feeling tired and stressed, nurses were driven by a strong sense of duty to care for their patients and help their colleagues. The shortage of staff and personal protective equipment (PPE) impeded their ability to provide care, raising ethical concerns and causing moral distress. Nurses reported physical symptoms and long-term emotional effects, with a notable rise in work-related mental health issues. Most nurses had insufficient time to recuperate between shifts, although some managed to take breaks and rest outside of work. They felt frustrated with the public for not following guidelines and perceived dishonesty from management regarding the durability of PPE. Organizations responded effectively by developing crisis response policies and improving patient flow.

Despite all demanding issues there were also positive work experiences perceived, for instance teamwork improved, and nurses received strong support from their co-workers and some managers. Nurses experienced professional growth and found satisfaction in being needed and making a difference. They turned challenges into opportunities, showcasing resilience and innovative problem-solving. However, despite these strengths, pathogenic factors in healthcare presented significant challenges and consequences for nurses' health.

Pathogenic factors in healthcare: Challenges and consequences for nurses' health

Not having control

The findings from study **II** and **III** show that 9.75% of the informants were given other or additional tasks or given another work role during the COVID-19 pandemic and that 8.4% of the informants were transferred to another department, another clinic or another hospital (in another city), however not everyone that was re-

allocated did so voluntarily. The findings from Study **II** revealed that the informants expressed a desire for increased control over their work. This was also supported by the findings from the qualitative studies (Study **I** and **IV**), where the informants described that they experienced a loss of control in that they could not influence their schedule, that there were many schedule changes at short notice which was especially difficult for single parents, and that they had to go in and work shifts they normally did not work. Some informants also described that they had to increase their working hours in order for the organization to function. Having little or no input on their working conditions was a potential cause of stress.

Stress of conscience

The findings from the interview study (Study **IV**) showed that nurses believed that they had a duty to care, and that it was this sense of duty towards patients and colleagues that motivated them to work despite feeling tired and stressed. The findings show that nurses had increased workload, lack of staff and personal protective equipment, all of which are factors that took time away from the patients' bedside thus potentially hindering nurses' duty to care.

Furthermore, the findings from study **I** and **IV** show that during the COVID-19 pandemic, healthcare workers frequently faced ethical concerns, feelings of inadequacy regarding their work and the reduced quality of care they could provide. The informants also had to perform their work despite a lack of resources such as time and materials. Some informants (study **I** and **IV**) reported that the responsibility of monitoring visitors' temperatures and COVID-19 symptoms, along with enforcing mask regulations, made them feel as though they were acting as police officers. This added layer of duty not only increased their workload but also created a sense of authority that was outside their usual professional role, contributing to their overall stress and fatigue. They also encountered unethical situations such as feeling like they worked at an assembly line when all patients received the same treatments or felt like they participated in aggressive or unnecessary treatments. Informants in study **I** and **IV** stated that they felt insufficiently involved in decision-making processes and often felt uninformed. This was also described in Study **II** where the informants felt that they had not received enough information and lacked the knowledge to feel safe performing their work tasks during the pandemic. These factors contributed to a higher occurrence of moral distress. In addition to the lack of information and knowledge, the informants also faced significant physical and psychological demands in their work.

Experience of ill-health and lack of recuperation

The findings from Study **II** revealed that the informants struggled to meet the physical demands of their work. They reported that their tasks often accumulated,

leading to significant frustration. Moreover, the work was characterized by numerous physically and psychologically challenging tasks, which left them with insufficient time to complete their responsibilities effectively. This highlights the need for better workload management and support systems to help employees cope with their demanding roles. Informants in both study **I** and **IV** highlighted that there were issues with their work environment in regard to having a lack of proper workplaces which made social distancing difficult, there was a lack of adequate isolation wards and having to redesign work areas led to spaces having insufficient ventilation. Informants in study **IV** described that they had to work outside during the pandemic to triage patients coming into the hospital, informants that worked in the ambulance services stated that they had to offload patients outside of the hospital which led to them having to push gurneys across various surfaces, not to mention exposing the patients to the elements and lack of privacy. The informants in study **I** and **IV** reported that working during the pandemic often resulted in experiencing various physical and mental symptoms and that the unique challenges and stressors of the pandemic environment significantly impacted their physical and mental well-being. While some symptoms were physical such as migraines, muscle aches, skin irritation and having physical symptoms from wearing the masks, the most long-term pathogenic effects concern the emotional aspects such as anxiety, exhaustion, depression and above all stress. The findings from study **II** shows that there was an increasing trend in (self-reported) work-related mental health diagnoses from 2017 to 2020, this was also corroborated in study **IV** where a majority of informants described having had work-related mental health problems during and/or after the COVID-19 pandemic. In study **I** the findings showed that nurses that had a higher age showed elevated risk of emotional exhaustion. The findings from study **II** showed that those who stated that they had work-related mental health problems had a mean age of 50 (2017). What could be discerned throughout the studies is the global lack of personal protective equipment and suitable workspaces which endangered the informants' health.

The studies clearly indicated that the majority of informants struggled with insufficient recuperation time, both during their shifts and between them. The findings from Studies **II** and **III** revealed that some informants felt their work pace was excessively high and that they did not receive adequate rest between shifts. Additionally, Study **II** indicated that the informants' work conditions negatively affected their personal lives, this was also described in study **IV**. Furthermore, many informants (study **I** and **IV**) reported experiencing sleeping problems, which began during the COVID-19 pandemic and persisted for some even afterwards. However, there were some exceptions; a few informants reported being able to take breaks during workhours and did not encounter issues with getting enough rest outside of work. The informants suggested that part of the reason for this was that their breakroom was outside the ward, which made it easier to take breaks. In addition, some mentioned that their experience in the profession helped them to relax despite

the challenging working conditions. Despite these positive exceptions, many informants still faced significant challenges in their daily work.

Feeling exasperated and dissatisfied

The findings from study **II** indicated that some informants did not find satisfaction in their daily work. Similarly, study **III** revealed that informants felt their work lacked meaning. Both study **II** and **III** highlighted a pervasive lack of joy in daily tasks. Informants in both study **II** and **III** expressed that their skills and competencies were not being utilized effectively. They felt that their potential was underappreciated and underused, leading to a sense of frustration and dissatisfaction. The findings from study **I** and **IV** show that the informants perceived frustration due to working with inexperienced colleagues, they were thankful that healthcare staff from other clinics were trying to alleviate their work. However, in many cases it had the opposite effect since the informants stated that they had to keep monitoring their colleagues and answering their questions, causing them to lose focus and time of their own work. Feeling exasperated with the general public for not adhering to recommended guidelines was another concern (study **I** & **IV**), which in turn could cause stress. The informants also described feeling discontent with management and organizations, not only due to the lack of PPE but also because of perceived dishonesty about the durability of protective equipment, which was known to last only a certain number of hours. The findings from study **I** showed that the informants felt that there were pressures to reduce costs and that the budget was more important than increasing the staff to help ease the workload. Additionally, the findings (study **I** and **IV**) showed that the informants felt unappreciated and unsupported, with management often being absent on the floor and not offering necessary support, this was also a source to frustration. Even though a lot of frustration was perceived during this time, there was also a growing sense of power and manageability (study **IV**). This transformation highlights the journey from stress to strength. By focusing on the positive aspects and harnessing inner strengths, individuals were able to turn adversity into an opportunity for growth and resilience. This shift not only improved their ability to manage the situation but also reinforced the importance of a salutogenic approach in fostering overall well-being.

From stress to strength: Salutogenic superpowers!

Organizational response

Although the COVID-19 pandemic took its toll on the organizations, the staff and the patients, there were not only negative consequences. The findings from study **I-**

IV, show salutogenic aspects on both the organizational level and especially on the individual level. On the organizational level, findings from both study **I** and **IV** showed that the organizations in question were effective in developing crisis response policies and providing communication updates. There was a better patient flow from the emergency department to other clinical areas, mostly to the infection clinics and wards or specialized COVID-wards. On the individual level the findings showed that teamwork improved, and that nurses' time was freed up by doctors calling the relatives of their patients in order to provide them with daily updates and thus nurses had extra time to be bedside. The findings from Studies **II** and **III** suggest that support from managers, and particularly from co-workers, was insufficient. However, the findings from Study **I** indicated that informants experienced good support from their colleagues but felt a lack of support from managers. In Study **IV**, all informants reported receiving good support from their co-workers, and in some cases, from their immediate managers.

Experiencing satisfaction and flourishing

The findings from study **IV** showed that some informants did not feel that the pandemic affected their health or well-being. That they could carry on with their lives in pretty much the same way as before. The findings from study **I** revealed that informants received support from both family and friends, which strengthened their resilience and helped alleviate stress. Another positive effect was professional growth which was described in both study **I** and **IV**, where the informants' competence grew by watching more experienced colleagues or simply by trial-and-error. The informants also described experiences of satisfaction from being needed and feeling that what they did made a difference such as being at the forefront of patient care, providing essential medical attention to those affected by COVID-19. Beyond physical care, nurses provided emotional support to patients and their families. They acted as a comforting presence, offering reassurance and empathy during a time of great uncertainty and fear. There was also satisfaction in seeing themselves or others flourish. Witnessing COVID-19 patients recover and leave the ward brought a sense of satisfaction and renewed hope (study **I** and **IV**). This positive outcome not only uplifted the spirits of the informants but also reinforced their commitment and resilience in the face of the pandemic's challenges. The crisis fostered a strong sense of solidarity and teamwork, with some informants describing an 'all hands on deck' mentality (study **IV**). The informants derived satisfaction from knowing their work had a meaningful impact. The recognition of their critical role in the healthcare system and the gratitude from patients and communities reinforced their sense of purpose. Despite the challenges, many informants demonstrated remarkable resilience. They found strength in their ability to adapt, innovate, and continue providing care under extreme conditions.

Discussion

It was interesting that Mirsch [35] stated that being a nurse no longer was a calling. In Sweden, applications to nursing schools increased in the wake of the COVID-19 pandemic so perhaps there was a calling after all or perhaps the cause of this was that the general public understood the importance of nurses and the work they do. In no way is there a wish in this thesis to detract from the important efforts made daily by other health professionals, it is a team effort. However, this thesis is focused on nurses' health and their working situation, especially in relation to an extremely demanding situation.

Loss of control and identity

The findings (study **I** and **IV**) indicated that many informants felt a significant loss of control over rostering and not feeling like they were able to provide input into decision making. This was also seen in other studies [138-139]. This loss of control can be seen as a lack of empowerment due to their inability to influence their own circumstances. Having more control over their tasks and responsibilities could most likely enhance their job satisfaction and overall productivity. This sentiment underscores the importance of empowering employees by providing them with the freedom to make decisions and manage their work processes independently. The pandemic undermined one of the General Resistance Resources – maintaining a strong sense of identity. Some informants (study **I** and **IV**) expressed that they felt like novices again, unable to mentor others effectively because the challenges posed by COVID-19 were new to them as well and thus in some ways making them loose part of their professional identity. Some of the informants (study II-IV) who expressed feeling more affected by the pandemic were of a higher age. Contrary to this observation previous research indicated that the ability to deal with problems generally increases with age [140]. However, it is important to note that psychological resilience, which is crucial for coping with job challenges such as stress, adversity, and trauma, is not solely dependent on age. Regardless of one's age, the key factor is the ability to adapt when facing these challenges [141-143]. This adaptability is what ultimately determines an individual's psychological resilience.

Nurses are leaving their workplaces, one third of the informants in our study (study **IV**) had changed their workplace after the pandemic. The informants in this

cohort acknowledged that it was good to have an influx of staff from other wards and even other regions to ease the workload, but it is important that nurses who work in extreme situations, such as a pandemic, do so of their own free will. That is, giving them back a sense of control and giving them a chance to feel empowered.

Balancing Duty and Safety

As noted in the findings from study **IV**, some nurses continued to work during the COVID-19 pandemic despite not feeling well themselves. Nurses have a duty of care, which encompasses their ethical, legal, and professional responsibilities to deliver safe, competent, compassionate, and ethical care to patients. McClelland and Chopra [144] highlighted that nurses are expected to be altruistic and risk their own lives to care for patients. However, it is vital to balance patient care with the safety of nurses. This balance involves managing the professional responsibilities of nurses alongside the physical, emotional, and moral risks they face. During pandemics or other crises, this duty becomes particularly challenging, as nurses often work under extreme conditions with high workloads and significant risks to their health. Several countries, including Japan, Canada, Australia, the U.K., and Sweden, have incorporated the duty of self-care into their nursing codes of ethics [145]. When individuals fail to balance their work duties with self-care, several negative consequences can occur. Prolonged stress and overwork may lead to burnout, which is marked by emotional exhaustion, depersonalization, and a diminished sense of personal achievement. Chronic stress and neglecting self-care can cause physical health issues, including cardiovascular diseases, musculoskeletal disorders, and weakened immune systems. The high demands and stressful conditions of nurses work can also result in anxiety, depression, and other mental health problems [146]. Overworked and stressed may cause nurses to struggle to provide high-quality care, result in errors and decreased patient satisfaction [147]. Additionally, poor work-life balance can result in job dissatisfaction and higher turnover rates, further straining healthcare systems. On the other hand, a recent study conducted in the United States [139] revealed that during the COVID-19 pandemic, nurses' committed support of each other and their patients led to eustress. The pandemic underscored the critical role nurses play in healthcare, amplifying their commitment to providing care and support despite the challenging circumstances.

Safeguarding nurses' health

The findings from study **I** and **IV** indicate that some informants experienced significant sleep disturbances, including difficulty falling asleep and frequent awakenings throughout the night. This was also found in another study [138] These sleep problems are not only risk factors for psychiatric, cardiovascular, and metabolic disorders [148], but they also have critical implications for infection

control. Sleep disturbances are linked to a weakened immune response, making individuals more susceptible to respiratory infections [149]. This decreased immunity can hinder the body's ability to fight off infections, underscoring the importance of addressing sleep issues among healthcare workers, especially during a pandemic. Ensuring that nurses have sufficient time and opportunities to recuperate both during and between shifts is crucial for maintaining their health and well-being. A well-rested and well-supported nursing staff is essential for patient safety. The findings from study **I-IV** indicated that many informants did not receive adequate rest during work hours or between shifts. Similar results were noted in another study [138]. According to Steinwedel [150], nurses who are fatigued, stressed, and unable to concentrate may not provide safe care. A recent study [151] showed that physical problems such as fatigue can reduce the resilience of nurses. During the pandemic many nurses experienced high workloads and a high nurse-patient ratio and thus potentially leading to feelings of stress and fatigue.

According to the International Council of Nurses (ICN) code of ethics (§ 2:4), it is imperative that nurses prioritize their own integrity, health, and well-being [152]. Achieving this requires a workplace culture that emphasizes professional affirmation, continuous education, opportunities for reflection and support, adequate resource allocation, supportive management structures, and a healthy and safe work environment. However, the findings from studies **I-IV** indicate that these essential conditions have not been met during the COVID-19 pandemic. The informants reported a lack of professional affirmation and support, which has been exacerbated by inadequate resources and insufficient management structures. The high demands and stressful conditions of the pandemic have further strained the work environment, making it difficult for nurses to maintain their health and well-being. This shortfall highlights the urgent need for healthcare organizations to reassess and improve their workplace cultures. Ensuring that nurses have access to ongoing education and professional development is crucial for their growth and competence [153]. Additionally, creating a supportive environment where nurses can reflect on their experiences and receive emotional and psychological support is vital for their mental health. While mental health interventions for nurses are crucial, it is equally important to implement organizational strategies such as reevaluating emergency action plans to optimize resource allocation [139]. Having adequate resource allocation might prevent burnout and ensure that nurses can perform their duties effectively without compromising their own health. Care management should establish specific structures and working conditions that support nurses, such as offering flexible scheduling, providing opportunities for professional growth, and fostering supportive team environments [154]. Furthermore, maintaining a healthy and safe work environment is fundamental to protecting nurses from physical and psychological harm as well as a mean to retain staff [155]. By addressing these areas, healthcare organizations can better support their nursing staff, ensuring they are equipped to handle the challenges of their profession while maintaining their

own well-being. This not only benefits the nurses but also enhances the overall quality of patient care.

The impact of COVID-19 on nurses' stress

It is unequivocal that nurses experienced elevated levels of stress before, during, and after the COVID-19 pandemic. This is consistently supported by the research performed for this thesis (study **I-IV**) and numerous other studies [156-157]. The COVID-19 pandemic is not the first major incident to cause significant stress among nurses. Previous research has shown that nurses experienced high levels of work-related stress during the SARS [158] outbreak in 2003 and the H1N1 [159-160] pandemic in 2009. But despite being trained to handle crises and manage high stress levels [161], the COVID-19 pandemic presented unprecedented challenges for healthcare workers. They faced unique concerns about having adequate PPE, the risk of contracting and spreading the virus, and the overwhelming workload [162].

Inadequate staffing has been identified as a significant concern across multiple studies (**I-IV**). Previous research indicates that external pressures, such as insufficient staffing levels, can lead to perceived distress among healthcare professionals. This distress often manifests as anger, resentment, and feelings of guilt [139]. These emotional responses not only impact the well-being of the staff but also affect their ability to provide quality care. Addressing staffing issues is therefore crucial in mitigating these negative emotions and improving both staff morale and patient outcomes. Some informants in study **IV** likened their experiences during the pandemic to working on an assembly line, where individualized care was sacrificed, and everyone received largely the same treatment. This approach conflicted with their nursing ethics, which emphasize person-centred care, and led to ethical stress. A recent study [163] showed that nurses experienced moral distress due to e.g. witnessing patients dying alone, families being prohibited from visiting patients, and the improper withdrawal of life support. And that nurses therefore experienced psycho-emotional symptoms such as anger, irritability, anxiety, and depression, as well as physical symptoms like insomnia. These findings underscore the profound impact of the pandemic on nurses' mental and physical health. Addressing these issues requires a concerted effort to ensure adequate PPE, support for ethical decision-making, and resources to manage stress and moral distress. By doing so, we can better support nurses in their critical roles and safeguard their well-being.

The informants in study **IV** reported feeling stressed due to inadequate PPE. Some informants working in ambulance services mentioned that they were not allowed to use their specially adapted breathing masks because they lacked the correct CE marking. Although some informants chose to use these masks anyway, it raises an important question: Why would healthcare organizations allow their staff to work with inferior breathing masks, thereby increasing the risk of exposure?

Furthermore, if nurses are forced to work with inadequate protection, what are the ethical implications for their duty to care for patients?

The findings from studies **I** and **IV** revealed that many informants felt significant frustration during the pandemic. This frustration was directed not only towards the general public, who often disregarded safety guidelines, but more intensely towards healthcare organizations, which were perceived as dishonest and unsupportive. A study from the United States [139] also highlighted a significant distrust towards management among nurses. Many informants felt that management was not transparent about the inadequacy of PPE and encouraging re-use of single-use materials. This perceived dishonesty exacerbated feelings of mistrust and frustration, further straining the relationship between healthcare staff and management. Addressing these concerns through open communication and honesty is essential to rebuild trust and ensure the well-being and safety of healthcare workers. Additionally, informants in study **IV** expressed their exasperation with individuals who questioned the existence of the COVID-19 virus and who spread false information about the pandemic. This was also found in a study by Craw et al [164] where the informants shared how individuals would question the severity of the situation, doubting whether people were truly sick or dying thus showing a lack of sensitivity from non-nurses which deeply frustrated the nurses.

These experiences highlight the emotional toll on healthcare professionals, who not only had to manage the physical demands of the pandemic but also navigate the psychological strain caused by public scepticism and organizational shortcomings. The frustration felt by nurses underscores the need for better support systems and public education to foster a more understanding and cooperative environment during health crises. Despite these challenges, one positive aspect that emerged was the experience of eustress during the pandemic (study **IV**). Previous research [165] has shown that eustress had a significant impact on the psychosocial work environment of nurses. This positive stress helped nurses stay motivated and energetic, enhancing their performance and promoting personal growth by instilling a sense of meaning and purpose in their work. This may have led to nurses feeling more engaged and capable of handling the high demands and stress with resilience brought about by the pandemic.

Resilience amidst crises

As previously noted, some informants in study **IV** felt that the pandemic had little impact on their lives. This resilience may be attributed to their strong sense of coherence, which provided them with stability and purpose amidst the challenges. The personal resources they metaphorically carried played a crucial role in maintaining this high level of coherence. Previous research shows that stress, depression [166-167], burnout, and PTSD are negatively correlated with a sense of coherence (SOC). SOC can serve as both a mediating and predictive variable for

these health issues [166]. Hence, enhancing SOC could potentially mitigate the adverse effects of these conditions.

The informants in studies **I** and **IV** expressed a profound sense of satisfaction from being needed and making a meaningful impact. They also found joy in observing their own growth and the growth of others. This resilience highlights their ability to transform the difficulties posed by the COVID-19 pandemic into opportunities, devising innovative solutions to overcome the obstacles they encountered. Recent studies have suggested that nurses and other healthcare professionals in China, Taiwan, and Israel experienced post-traumatic growth [168-169]. It has been suggested that individuals who are satisfied with their work are more likely to find meaning in it, which could facilitate post-traumatic growth [169]. Ida et al. identified a positive relationship between SOC, job satisfaction, and workplace adaptability [170]. SOC was also linked to all General Resistance Resources (GRRs), with work control being the most significant, followed by social relationships and task importance [171]. Nurses with high SOC scores reported better health, greater work engagement, and more social support [172]. Additionally, individuals with high SOC tend to have better sleep quality [173] and employ problem-oriented strategies to cope with workplace stress, thereby making sense of the stress they experience [174].

Some informants in the interview study (study **IV**) described their experiences during the COVID-19 pandemic as traumatic. This aligns with findings from two studies on Palestinian health workers that explored the relationship between SOC and war trauma. Veronese and Pepe found that SOC partially mediated the impact of trauma on anxiety and social dysfunction and fully mediated the relationship between trauma and loss of confidence [175]. This indicates that a strong SOC can help mitigate some of the negative psychological effects of trauma. Another study by Veronese and Pepe further demonstrated that psychological distress was positively correlated with symptoms of intrusion and avoidance, and negatively correlated with SOC. This confirms SOC's role as a mediating factor in the effects of trauma on mental health across different professional groups [176]. In other words, individuals with a higher SOC are better equipped to handle the psychological impacts of trauma, reducing the likelihood of severe mental health issues.

These findings highlight the importance of fostering a strong SOC among healthcare workers, particularly nurses, who are often on the front lines during crises like the COVID-19 pandemic. Enhancing SOC could be a key strategy in helping nurses cope with the traumatic experiences they face, thereby improving their overall mental health and resilience. This could involve providing more robust support systems, continuous professional development, and creating a work environment that promotes a sense of coherence and well-being.

The impact of social and instrumental support on nurses' well-being

Support can be divided into instrumental and social support. Instrumental support can be described as a form of social support that focuses on solving practical problems and reducing stress by relieving and helping with specific tasks. Social support refers to the assistance and comfort received from others, which can be crucial for well-being and ability to handle stress and challenges [177-178]. During the pandemic and when there is a shortage of staff, nurses were unable to help colleagues due to lack of time and resources. The findings from study **I-IV** showed that most informants felt a strong social support from family and colleagues which could increase the effect of GRR and thus helping the nurses cope with stress. Research indicates that nurses who receive support and successfully navigate psychological challenges tend to experience lower levels of anxiety [179]. The informants (study **IV**) described social support as difficult to offer during the pandemic due to social restrictions when they were not allowed to sit closer than 2 meters and thus were unable to give your colleague a hug when he or she had a difficult time. They also found it difficult not to be able to meet the relatives of the patients they cared for so that they could determine how they reacted to information about the patients' condition. Having social support increases the possibility to manage situations and increase one's sense of well-being and community, whilst not having or not being able to give enough support can cause ethical stress.

The Job Demand-Control-Support model (JDCS) [180] explains how job characteristics influence employees' perceived health and well-being. The informants (study **I-IV**) stated that they during the pandemic faced increased job demands due to staff shortages and the high volume of patients. This increased workload made it difficult for nurses to provide instrumental support to their colleagues, as they lacked the time and resources to assist with specific tasks. The inability to offer or receive instrumental support reduced nurses' control over their work environment. They couldn't manage their tasks effectively or alleviate their workload, leading to increased stress and a sense of helplessness. While available resources and supplies are part of organizational support, Eisenberger et al. [181] emphasize that feeling supported goes beyond just salary, resources, and awards.

Instrumental support involves practical assistance with tasks, which can help reduce job demands and stress. However, during the pandemic, the lack of time and resources prevented the informants from providing this support to each other (study **IV**), exacerbating their stress levels. Social support, which includes emotional comfort and assistance from others, is vital for well-being. The pandemic's social restrictions, such as maintaining physical distance and the inability to offer physical comfort (e.g., hugs) (study **I** and **IV**), hindered the provision of social support. This lack of social interaction and emotional support further increased stress and ethical concerns among nurses. The inability to provide or receive adequate support, both instrumental and social, contributed to ethical stress. The informants experienced distress due to their inability to support colleagues or connect with patients' families

(study **IV**), impacting their sense of well-being and community. Recent research has shown that disasters and pandemics can create complex morally stressful situations [182]. Despite these challenges, some informants (study **IV**) exhibited remarkable resilience by discovering innovative ways to manage the heightened demands and lack of support such as doing yoga, bringing treats to work or having 'social distancing picnics' with colleagues. Their adaptability and resourcefulness not only helped them cope but also underscored the critical role of resilience in navigating such crises. This resilience is crucial for maintaining well-being in high-stress environments. By integrating the concepts of instrumental and social support into the JDCS model [180], we can better understand how the lack of these supports during the pandemic exacerbated job demands and reduced job control, leading to increased stress and ethical concerns among nurses. This highlights the importance of ensuring adequate support systems to enhance job control and manage job demands effectively.

The findings from study **I** and **IV** have shown that the informants experienced problems with the physical and psychological work environment. Florence Nightingale (1860) emphasized the importance of a well-designed nursing environment, and modern research continues to support this. Environmental factors such as noise levels, ventilation, temperature, lighting, and the possibility of ergonomic performance of work tasks have a significant impact on people's health and well-being [183-184]. The physical space plays an important role in the healthcare staff's work environment and their well-being, as does the psychological environment. Instrumental support, which includes tangible assistance such as resources, tools, and help with tasks, is crucial for enabling employees to perform their duties effectively.

Social support, encompassing emotional encouragement, camaraderie, and a sense of belonging, plays a vital role in maintaining morale and mental well-being. A good working environment is characterized by the presence of both instrumental and social support. Social support plays a crucial role in employee job satisfaction [185]. Previous research has demonstrated that higher levels of social support, whether received or perceived, enhance employees' participation and commitment to their work, ultimately leading to greater job satisfaction [186]. Rousseau and Aubé [187] highlight that social support in the workplace fosters a positive work experience, which in turn promotes a stronger commitment to one's job. By cultivating a supportive work environment, organizations can significantly improve employee morale and productivity. Based on the findings from study **IV**, some informants reported that the pandemic did not impact their health or work situation. This could suggest that when employees have access to essential resources and receive support from their colleagues and supervisors, they are more likely to experience job satisfaction and lower stress levels. Previous research has demonstrated that creating environments that boost employees' sense of empowerment can positively impact their well-being and, in turn, improve overall organizational effectiveness [188]. Moreover, a positive work environment that

prioritizes support can mitigate the adverse effects of high-stress situations, such as those experienced during the COVID-19 pandemic. For instance, nurses who received adequate instrumental support, such as sufficient PPE and manageable workloads, alongside social support from their peers and supervisors, were potentially better equipped to handle the increased demands and emotional toll of their work. In essence, instrumental and social support are not just beneficial but essential components of a good working environment. They create a foundation where employees can thrive, adapt to challenges, and maintain their well-being, ultimately leading to a more resilient and effective workforce.

Creating a person-centred workplace

The initial study (study **I**) did not yield any findings related to person-centredness during the pandemic. However, the interview study (study **IV**) highlighted the importance of adopting a person-centred approach not only for patients but also for healthcare staff. This underscores the need for a holistic person-centred strategy within healthcare settings. The person-centred perspective places the person at the centre and the focus is on the person to be treated as a sovereign unique person and based on what strengthens his/her unique well-being [189-191]. Person-centredness requires the responsiveness of the environment, good communication, understanding, flexibility and support to adapt the circumstances to the unique person's needs, wishes and priorities [189-191]. In person-centred care, the importance of good communication and good relationships is emphasized [192-194]. Participation and good relationships are a fundamental aspect of person-centredness, and it is important to be responsive in the communication process [32, 192]. Good communication and good relationships are also important tools for the health-promoting organizational and mental work environment [195] and also causes successful person-centred care to be described as providing higher job satisfaction and lower stress of conscience among staff [194-196]. This reflects how salutogenesis and person-centredness interact. The informants (study **IV**) stated that they did not feel included in decision making. Participation and, as far as possible, being included in decisions and processes is important for employees' health and are also important aspects in employee engagement, work motivation and a sustainable health-promoting work situation with good employability over a long working life [85,92,195]. The health concepts salutogenesis and pathogenesis are central in person-centred care, where the focus is on the individual's unique needs and resources, hence why it is important to illuminate the whole from both health perspectives. Salutogenesis is about identifying and strengthening the factors and processes that contribute to health and well-being, also called "health resources". This perspective emphasizes people's abilities and resources to deal with life's challenges and create a meaningful existence.

Pathogenesis, on the other hand, focuses on the factors that cause disease and illness. This perspective is more traditional in medicine and involves identifying and

treating diseases and their causes. In person-centred care, this means that the care also considers the specific diseases and health problems that the individual has, but that this is done in conjunction with a salutogenic approach. The International College of Person-Centred Medicine (ICPCM) has acknowledged the central role of salutogenic concepts in promoting and preserving health and well-being [197]. This is of particular importance during crises, such as wars, natural disasters and pandemics.

Having good leadership is a vital part of creating person-centred workplaces. Some research links leadership style to nursing work conditions. For instance, multiple studies show positive effects of an authentic leadership strategy within the nursing profession [198-199]. The findings from the studies (**I-IV**), with a few exceptions, showed that the experiences were that managers were mostly absent and unsupportive. This caused frustration and was one of the aspects that informants thought of when leaving their workplace. Kleinman [200] found that when leaders had a high visibility in the departments and were supportive of staff it had a positive influence on nurse retention.

Person-centredness can be seen both from the perspective of the patient in focus and from the perspective of the nurse in focus. In order to be able to offer good person-centred care, it is important not to forget that the healthcare staff themselves also need to feel well and experience well-being in order to perform their work in the best possible way. This was what was lacking according to the results in study **IV** and in some extent in study **I**. Very little research has been done on how person-centred care affects the work environment of healthcare staff, making it important to reflect on how a person-centred work environment can be created and maintained. A person-centred work environment means creating a workplace where the needs, abilities, and well-being of healthcare staff are in focus.

Just as in person-centred care, it is important that healthcare staff feel like equal partners in the work environment. This means they have influence over decisions that affect their work and work environment. The findings from studies **I** and **IV** indicate that the informants felt they had little influence over decision-making processes. This lack of influence has also been highlighted in previous research [138-139]. A person-centred work environment must be built on mutual respect and understanding of each other's knowledge and experiences. This includes recognizing and valuing the staff's insights into what it is like to work in healthcare. A person-centred work environment must take into account the psychosocial work environment, which means creating a workplace where staff feel safe, appreciated, and motivated. This can help reduce stress and burnout. Effective communication and collaboration between different professional groups are crucial for creating a person-centred work environment. This means encouraging open dialogues and working together to solve problems and improve work processes.

In a person-centred workplace, it is important to have person-centred leadership with the individual, i.e., the employee, in focus, seeing them as an individual and not just a name to fill a position. To work person-centred at the management level,

those responsible for the operations need to find out what the recipient want, think, feel, and can do. In this way, the perspective can shift from an operational perspective to a person-centred perspective.

As mentioned previously it is important for organizations and managers to see each employee as a unique individual. When organizations and leadership create conditions for nurses to be valued as individuals, in an atmosphere of trust, support, participation and respect, burnout can be reduced and perhaps, in the long term, nursing teams can be more stable, and the individuals can flourish. The nursing leadership style, the perceived support of the organization and a work environment based on trust, are positively associated with nurses' well-being, nurse retention and with the improvement of nursing care quality [201]. Although work-related salutogenic research has existed and expanded, albeit slowly, for the past 20 years, perhaps now it is finally happening, perhaps it took a pandemic to understand that something radical had to be done. Ultimately, it is crucial that the work environment for nurses' transitions from a state of crisis to one that genuinely supports and cares for the staff.

"This is not the end – it is the beginning of change"

(Accredited to Winston Churchill)

Methodological considerations

Methodological discussions are important for several reasons. They help make the research process clearer and more transparent, enabling other researchers to understand how the study was conducted. This is crucial to be able to replicate the findings and assess the credibility of the study. A careful methodological discussion ensures that the findings are dependable and valid. By reviewing and discussing the methods used, researchers can identify potential sources of error and bias, which strengthens the study's conclusions. By participating in methodological discussions, researchers can learn from each other's experiences and improve their own methods. This leads to continuous development and improvement of research methods in the field.

The study population in papers **I-IV** was limited to Swedish nurses and in study **IV** the sample turned out more homogenous than expected since all informants had Swedish/ half-Swedish descent. A potential limitation in study **IV** was what can be perceived as a low number of informants (n=14). However, after 12 interviews saturation was experienced. One concern when doing any type of studies with informants is healthy worker and selection bias, where we could end up missing those with poor health that has already left the work force. In study **II** (n = 4692 vs

n = 3107) and **III** (n = 143) the sample sizes were relatively large which works in our favour since internal comparisons are reported as one of the most effective ways to reduce healthy worker effect [202].

The *credibility* of qualitative study findings hinges on how much the reader trusts the research and its findings, which is the primary aim of qualitative research [203]. In study **IV** we examined what was relevant to the research area through semi-structured interviews. The use of semi-structured interviews in qualitative studies contributes to credibility in several ways. Credibility in qualitative studies is about ensuring that the findings are trustworthy, transferable, and confirmable. Semi-structured interviews allow for in-depth insights and detailed responses from informants by providing a more nuanced view of the research topic. By using a clear and transparent interview guide, researchers can ensure that the interview process is consistent and reproducible, which strengthens trustworthiness. Detailed descriptions of the interview process and context enable other researchers to assess how the findings can be transferred to other contexts. The semi-structured interview guide (Appendix I) was used for all interviews which increases the dependability. *Confirmability* addresses the objectivity of data interpretation [203]. Interview findings are inherently linked to the researchers, as their prior understanding plays a crucial role in the interpretation process. It is beneficial for the analysis to be conducted by multiple individuals [204]. The researchers who analysed the material in the included studies (study **I-IV**) have different professional backgrounds such as nursing and public health which also contributed to maintaining the objectivity. In order to gain a deeper understanding and to have a more diverse sample in study **IV** we chose to include informants from another region. One thing that could have increased the credibility would have been to let the informants read their transcribed interview in order to make sure that it captured what they were trying to say. However, a good reason for not having informants review their transcribed interviews could be the need to maintain the authenticity and spontaneity of their responses. Revisiting the transcripts could lead to retrospective changes that might alter the original context and meaning of their statements.

According to Creswell and Creswell [205] *internal validity* includes how reliable the findings are that is if the study investigates what was intended to be studied. The findings answer the aim of the study, and the questionnaire is consistent with the purpose of the studies (**II** and **III**). Polit and Beck [206] states that *construct validity* concern the accuracy of measuring the phenomenon under study. It cannot be ruled out that some of the questions in the questionnaire may have been misunderstood. Among the included questions there were no internal non-response. *External validity* refers to how well the findings of a study can be generalized to the broader population, different settings, and future scenarios [205]. The sample in the study can be seen as representative of the nursing population and can most likely be generalized to similar populations and settings. With the high likeliness for future pandemics or major events the findings from studies performed during the SARS-CoV-2 pandemic can likely be applied. The questionnaire (study **II** and **III**) has

been used in several previous studies, and it is likely that an independent researcher would come to the same findings.

Alternative analysis methods

In study **I**, one alternative could have been thematic analysis of the material. In study **II** and **III** we could have used factor analysis if we wanted to identify underlying relationships between observed variables. However, the focus of the study would then be on psychometrics or to merge questions into component factors for further analysis. Another option could have been to take the key factors that affected nurses' health (study **II**) and then used structural equation modelling (SEM) to explore these complex relationships further. If we wanted to group nurses based on similar health profiles or risk factors (study **III**) we could have used cluster analysis. In study **IV**, one of the alternative methods for analysis was discourse analysis and this is something we discussed at length. It could have been interesting to have had focus groups discussions before the individual interviews. Another approach for paper **IV** could have been phenomenology or thematic analysis.

Conclusion

The current study sought to better understand the experiences of nurses' health and work situation before, during and after the COVID-19 pandemic. In conclusion, the pandemic has underscored the critical need for empowering nurses by giving them more control over their tasks and responsibilities both as individuals and in a group. This empowerment is essential not only for enhancing job satisfaction and productivity but also for maintaining their psychological resilience. The pandemic highlighted the importance of balancing the duty of care with the safety and well-being of nurses, emphasizing the need for supportive management structures, adequate resource allocation, and a healthy work environment. The experiences of nurses during the pandemic revealed significant stress and frustration, exacerbated by inadequate protective measures and organizational shortcomings. These challenges underscore the necessity of robust support systems and public education to foster a cooperative environment during health crises. The resilience demonstrated by some informants, driven by a strong sense of coherence and social support, highlights the potential for post-traumatic growth and the importance of a supportive work culture. Ultimately, creating a person-centred workplace that values the needs and well-being of healthcare staff is crucial. This involves fostering mutual respect, effective communication, and collaboration, as well as providing opportunities for professional development and emotional support. By prioritizing the health and integrity of nurses, healthcare organizations can ensure that they are

better equipped to handle future crises while maintaining high standards of patient care.

Future studies remain necessary to assess the factors associated with the development of mental health problems among healthcare workers. Strong recommendations are aimed at governments, policymakers, and relevant stakeholders to pay close attention to and address the mental health burdens of healthcare workers.

Knowledge contribution and relevance

The new knowledge that was generated from this project is valuable for the design of healthy and sustainable workplaces of the future, especially with a focus on the nurse's work situation. The knowledge intends to contribute to preventing sick leave, flight from the nursing profession, promoting health and strengthening the possibility for a longer working life. My thesis can thus also be a contribution to how the health and medical care's supply of skills can be optimised. The dissertation's expected new contribution to knowledge is linked to the UN's sustainability goals 3 (ensuring healthy lives and promoting well-being for all at all ages) and 8 (that all people should have a job with good working conditions) in Agenda 2030 [207].

The findings of the thesis intend to contribute to knowledge about what gives the possibility of a healthy, longer and sustainable working life and employability as a nurse in the health care sector.

Need for further research

Further research is necessary to identify effective interventions for reducing job stress and its negative impacts. The COVID-19 pandemic highlighted the precarious employment conditions many nurses face, which can adversely affect their physical and mental health. Understanding how these conditions impact health is crucial for developing policies to protect nurses. Additionally, more research with a salutogenic focus is needed. Consequently, it is important to explore how a person-centred work environment can be established and sustained, prioritizing the needs, abilities, and well-being of healthcare staff.

Epilogue

In the prologue, I pondered whether we could draw parallels between the Crimean War, where Florence Nightingale and Mary Seacole made significant impacts, and modern healthcare, especially as we face another conflict on the Crimean Peninsula. Despite our extensive knowledge of how a good working environment affects staff well-being, we still face major challenges in today's healthcare. It is paradoxical that, despite technological advances and increased awareness, we continue to struggle with issues such as overcrowding, patients in corridors, temporary premises, and poor ventilation.

Overcrowding of hospitals leading to patients being placed in corridors is a global problem and often result from a lack of resources and beds [208-209]. When hospitals are overcrowded, patients are forced to wait in corridors, which is not only unsafe but also negatively impacts their recovery. This creates a stressful work environment for healthcare staff, who must manage more patients than is optimal. Working in temporary premises with poor ventilation can lead to numerous health problems for both patients and staff, as was found in study **IV**. Poor air quality can exacerbate illnesses and create an unpleasant work environment, which in turn can affect staff efficiency and morale. Unfortunately, research has shown that many nurses had to endure these conditions during the pandemic. So why haven't we made more progress? Several factors contribute to these problems:

1. **Financial constraints:** Many healthcare facilities have limited budgets, making it difficult to invest in necessary infrastructure improvements.
2. **Shortage of personnel:** A global shortage of healthcare workers means that existing staff are often overworked, leading to burnout and reduced quality of care.
3. **Bureaucracy and slow decision-making processes:** Changes in healthcare can be slow due to complex decision-making processes and bureaucracy. Changes must also occur on several levels.
4. **Increasing healthcare needs:** An aging population and rising numbers of chronic diseases increase the pressure on the healthcare system, making it difficult to keep up with demand.

These challenges are linked to two of the UN's global sustainability goals [207]:
Goal 3: *Good Health and Well-being* aims to ensure healthy lives and promote well-being for all at all ages. A good working environment for healthcare professionals

is crucial to achieving this goal, as the health and working conditions of staff directly affect the quality of care they can provide. Goal 8: *Decent Work and Economic Growth* emphasizes the importance of promoting inclusive and sustainable economic growth, full and productive employment, and decent working conditions for all. Improving the working environment in healthcare is part of creating decent working conditions, which in turn can lead to better care and increased well-being for both staff and patients.

Despite these challenges, it is important to continue striving for improvements. By integrating historical lessons (including those from previous pandemics) and working towards the UN's global sustainability goals—such as investing in better working environments and streamlining care processes—we can move towards a more sustainable and efficient healthcare system that benefits both staff and patients. Achieving this requires cooperation between politicians, healthcare organizations, and healthcare staff.

Our studies and those of others have shown that many nurses have or are in the process of burning themselves out. Poortaghi et al [210] has an interesting take on burnout, i.e. that it could be a sign of nurses learning to protect their work-life balance so they can be healthy and strong when their patients need it most. Whatever the case, and as McClelland and Chopra [144] states, healthcare workers should not need to choose between caring for themselves and caring for patients.

The way forward: What do we do now?

The findings show that Swedish healthcare is undersized, and that more focus needs to be on primary care taking more responsibility (and having the necessary resources to do so). Training healthcare staff is expensive and takes time, and ongoing efforts are made to improve the global health workforce shortage [211]. Nursing schools in Sweden have received directives that they must increase their admission of nursing students each term, however, many schools have limitations in terms of staff and premises in order to take care of these students in a good way. This can potentially lead to poorer opportunities for the teachers in the nursing programs to effectively prepare the students for their future professional role and the challenges they will face. Which may be a contributing reason why some nurses quit after only a few years in the profession. In addition, it is also important for nursing students to take more responsibilities for their studies. Tsai [212] states that it is important to empower nursing students to take charge of their learning since it nurtures habits of lifelong learning, critical thinking, and adaptability, which are essential in the ever-evolving field of healthcare.

According to the Swedish Work Environment Agency's annual report on occupational injuries in 2023 [213], the most common cause of occupational diseases is poor organization and social factors, such as high workloads with little opportunity to influence one's work and recover. Therefore, it is crucial to improve the organizational structures and working conditions for nurses. While striving for a sustainable working environment is essential, it will take time to achieve.

One pressing issue is the supply of skilled healthcare workers. We cannot simply conjure up a large number of new healthcare staff; instead, we need to think creatively about how to utilize existing staff more effectively. This might involve finding new ways of working or redistributing tasks.

What can be done to improve nurses' work situations? Nurses should receive fair compensation for their critical role in caring for human lives. This echoes Florence Nightingale's fight for decent wages for nurses—how is it that we are still battling this issue today? Some organizations in Sweden are experimenting with different interventions, such as shorter workdays or reduced work hours. For example, one model involves nurses working six-hour days, while another implements a 34-hour workweek, both of which seem to provide staff with more opportunities for recuperation.

Additionally, fostering teamwork, creating opportunities for training and promotion, and cultivating a culture of recognition could also prove effective in improving nurses' work conditions. By addressing these areas, we can better support the nursing staff and enhance their overall well-being.

Using artificial intelligence

> "Haven't I taught you anything? What have I always told you? Never trust anything that can think for itself if you can't see where it keeps its brain?"
>
> — J.K. Rowling, Harry Potter and the Chamber of Secrets

Even though I have been a bit of an opponent of AI, maybe AI could still be one of the solutions. AI could be used in several ways to solve organizational problems in healthcare. Artificial intelligence has been a part of medicine since the 1950s, when physicians first began using computer-aided programs to enhance their diagnostic capabilities [214]. In recent years, interest and advancements in medical AI applications have significantly increased, driven by the greatly improved computing power of modern computers and the vast amounts of digital data available for collection and use [215]. Preliminary studies have already shown that AI can detect symptoms of, for example, heart attacks faster than what a human can do and that it could detect tumours at an earlier stage. Could AI automate documentation and record keeping, which would then reduce the administrative burden on healthcare professionals and free up time for patient care? Could we use AI for resource optimization such as personnel planning and inventory management? AI-powered systems can monitor patients' vital signs in real time and alert health care professionals when necessary, improving patient safety and quality of care. Predictive analytics: AI can predict patient flows and disease outbreaks, helping hospitals prepare better and allocate resources more efficiently. However, any implementation of AI in healthcare requires careful planning and consideration of ethical and legal aspects to ensure that the technology is used safely and effectively.

Initiated and planned research studies:

- One of the goals in the beginning of this PhD project was to examine whether nurses were able to work according to person-centredness during the pandemic? Data gathered in the interviews (study **IV**) will be analyzed.
- In the interview study (**IV**) the informants also put forward requests and suggestions for changes in the clinical work. This material will be analyzed and will hopefully result in research output.
- Action research based on study **I-IV** to produce an action plan to improve nurses' work situation is under work. Here we plan to include clinically active nurses (Group Concept Mapping) in the research. (Pilot-studies have begun).
- It is also important to continue research on how a person-centred workplace can be created since it is important for employees to feel like a unique individual and not a game piece on a chessboard.

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Interview guide

1. What is your educational background?

2. What professions and workplaces have you worked at/in before you started working at your current workplace?

3. How long have you worked as a Registered Nurse? Specialist nurse?

4. Describe why you started working as nurse

5. I would like for you to describe your feelings when you first heard of COVID-19

6. Describe with your own words what happened when the pandemic came

7. Describe how you experience your health in relation to your work, work situation and work environment before, during and after the pandemic.

8. Describe how you experience your physical work environment before, during and after the pandemic.

9. Did you get infected with COVID-19?

10. Describe how you experience your mental work environment and work situation before, during and after the pandemic.

11. Describe how you experience your opportunity to recuperation before, during and after the pandemic.

12. Describe how the work situation has affected your economy before, during and after the pandemic.

13. Describe how you experience your private social environment before, during and after the pandemic.

14. Describe how you experience your work social environment before, during and after the pandemic.

15. Describe how you experience:
a) your work satisfaction before, during and after the pandemic
b) your stimulance with work tasks before, during and after the pandemic

16. Describe how you experience your knowledge, ability and opportunity for competence development before, during and after the pandemic.

17. Describe a work situation you experienced as problematic and negative, that made you want to leave your workplace/profession before, during and after the pandemic.

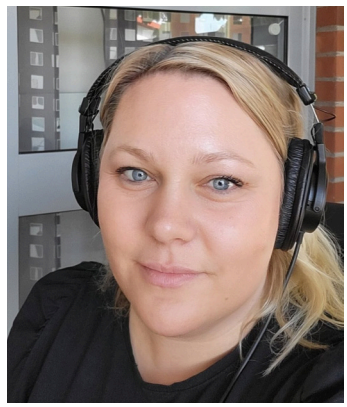
18. Describe a work situation you experienced as strengthening and positive, that made you want to continue working in your workplace/profession before, during and after the pandemic.

19. What would you like to improve regarding: Your self-rated health, Your physical work environment, Your mental work environment, Your work time, work pace, recuperation, Your personal finances, Your private social environment, Your work social environment, Your work satisfaction, motivation and stimulance with work tasks, Your competence development

20. Describe what works extra well in your work situation regarding: Your self-rated health, Your physical work environment, Your mental work environment, Your work time, work pace, recuperation, Your personal finances, Your private social environment, Your work social environment, Your work satisfaction, motivation and stimulance with work tasks, Your competence development

23. To summarize: What makes you want and be able to continue working in your profession and at your workplace? Has it changed since before the pandemic? In what way?

About the author



CICILIA NAGEL has a background as an anaesthetic nurse and education with a special interest in nurses' health and work situation. Cicilia is employed at Kristianstad University and did her doctoral studies at Lunds University. The overall purpose of the thesis is to investigate and develop new knowledge about how the COVID-19 pandemic affected the work situation and health of nurses, as well as what preventive measures need to be taken in the healthcare organization in the face of similar future scenarios.

This thesis highlights the critical need to empower nurses by giving them more control over their work, which enhances job satisfaction, productivity, and psychological resilience. The pandemic emphasized the importance of balancing care duties with nurses' safety and well-being, requiring supportive management, adequate resources, and a healthy work environment. Nurses faced significant stress and frustration due to inadequate protective measures and organizational shortcomings, underscoring the need for robust support systems. The resilience shown by some nurses points to the potential for post-traumatic growth and the importance of a supportive work culture. Creating a person-centered workplace that values healthcare staff's needs and well-being is crucial for handling future crises and maintaining high patient care standards.

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