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# FACTORS THAT EXPOSE NURSES TO PATIENT AGGRESSION IN PSYCHIATRIC AND NON- PSYCHIATRIC SETTINGS

An observational study

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Virve Pekurinen



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An observational study

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*To my mother and extended  
family*

## **ABSTRACT**

Virve Pekurinen

### **FACTORS THAT EXPOSE NURSES TO PATIENT AGGRESSION IN PSYCHIATRIC AND NON-PSYCHIATRIC SETTINGS – AN OBSERVATIONAL STUDY**

University of Turku, Faculty of Medicine, Department of Nursing Science, Turku, 2018

The overall aim of this study is to describe nurses' individual characteristics and relationship and work environment factors that expose them to patient aggression in psychiatric and non-psychiatric care settings (emergency, and medical and surgical specialties). The Socio-Ecological Model for the prevention of patient-to-worker aggression in hospitals was used as a theoretical framework. The setting of this study was made up of the 21 hospitals that were included in the Finnish Public Sector Study. The participants were the nurses who participated in the Finnish Public Sector Study in 2012 and 2015.

First, the extent of the problem was described by determining the occurrence, characteristics and consequences of aggression in psychiatric and two non-psychiatric settings by using cross-sectional data from 5228 nurses. Second, cross-sectional approaches were used to identify how nurses' individual characteristics, relationship and work environment factors were associated with their experiences of patient aggression in psychiatric specialties (758–923 nurses). Third, a longitudinal approach was used to investigate the associations identified in the cross-sectional analysis, in all three nursing groups (2981 nurses). Different types of statistical methods were used to analyze the data, e.g., descriptive statistics, logistic regression and advanced modeling techniques.

The results reveal that aggression was experienced by 41% of nurses (N=5228). The most commonly experienced type of aggression was mental abuse, and the rarest type was armed threats. The consequences of aggression in terms of sleep problems and psychological distress may have been more severe in non-psychiatric nursing groups compared to the psychiatric nursing group. Regarding exposing factors, significant associations between nurses' individual characteristics and patient aggression were identified in the psychiatric, and medical and surgical nursing group, while none were found in the emergency nursing group. In the non-psychiatric nursing groups, the relationship factor of poor team climate, and the work environment factors of high effort-reward imbalance, high job strain and poor organizational justice at baseline were associated with increased patient aggression at the follow-up. However, these associations differed between the two non-psychiatric nursing groups.

The results of this study show the complex nature of patient aggression in healthcare. Improving nurses' relationship and work environment factors when aiming to reduce patient aggression may be useful. However, the results of this study indicate that the non-psychiatric care environments may be more vulnerable to patient aggression related to problems at the relationship and work environment levels. More studies are needed to support the findings of the study.

**Keywords:** Nursing, aggression, socio-ecological model, observational study

## **TIIVISTELMÄ**

Virve Pekurinen

### **POTILAAN HOITAJAAN KOHDISTAMA AGGRESSIIVINEN KÄYTTÄYTYMINEN: ALTISTAVAT TEKIJÄT PSYKIATRISISSA JA SOMAATTISISSA TERVEYDENHUOLLON YMPÄRISTÖISSÄ - HAVAINNOINTITUTKIMUS**

Turun yliopisto, Lääketieteellinen tiedekunta, Hoitotiede, Turku, 2018

Tutkimuksen tarkoituksena oli kuvata hoitajien yksilöllisiä, työpaikan ihmissuhteisiin ja työympäristöön liittyviä tekijöitä, jotka altistavat hoitajia potilaan aggressiiviselle käyttäytymiselle sekä psykiatrisen että somaattisen (ensihoito- ja päivystyspalvelut, muut somatiikan palvelut) terveydenhuollon ympäristöissä. Havainnointitutkimuksen teoreettisena viitekehysenä käytettiin sosio-ekologista mallia potilaan aggressiivisen käyttäytymisen ennaltaehkäisyyn terveydenhuollossa. Tutkimus toteutettiin Työterveyslaitoksen Kunta-10 tutkimukseen kuuluvissa 21 sairaalassa. Tutkimusaineisto muodostui hoitajista, jotka vastasivat Kunta-10 tutkimuksen kyselyyn vuosina 2012 ja 2015.

Tutkimuksessa selvitettiin ensin aggression esiintyvyyttä, piirteitä ja seurauksia psykiatrisessa ja kahdessa somaattisen terveydenhuollon ympäristössä 5228 hoitajan poikittaisaineistoa hyödyntäen. Seuraavaksi pyrittiin tunnistamaan hoitajia psykiatrisissa ympäristöissä potilaan aggressiiviselle käyttäytymiselle altistavia yksilöllisiä, työpaikan ihmissuhteisiin ja työympäristöön liittyviä tekijöitä poikittaisasetelmaa hyödyntäen (758–923 hoitajaa). Lopuksi näitä poikittaistutkimuksessa tunnistettuja altistavia tekijöitä tutkittiin pitkittäisasetelmaa käyttäen kaikissa kolmessa hoitotyön ympäristössä (2981 hoitajaa). Aineiston tilastollisessa analysoinnissa käytettiin kuvailevien menetelmien lisäksi muun muassa logistista regressiota ja edistyneitä mallinnustekniikoita.

Noin 41 % hoitajista kohtaa erityyppistä aggressioita työssään (N=5228). Yleisin hoitajien kohtaama aggression tyyppi on henkinen väkivalta, harvinaisin tyyppi on aseellinen uhkaus. Hoitajien kohtaaman aggression seuraukset, kuten uniongelmat ja psyykinen stressi, voivat olla vakavampia somatiikan kuin psykiatrian ympäristöissä. Potilaan aggressiivisen käyttäytymisen kohtaamiseen altistavia hoitajan yksilöllisiä piirteitä löydettiin sekä psykiatrisissa että somatiikan ympäristöissä, pois lukien ensihoito- ja päivystyspalvelut. Somatiikan ympäristöissä tunnistettiin työpaikan ihmissuhteisiin ja työympäristöön liittyviä tekijöitä, jotka vaikuttavat altistavan hoitajia potilaan aggressiiviselle käyttäytymiselle. Näitä olivat muun muassa työyhteisön ilmapiirin ongelmat, työn kuormittavuus, ristiriita työhön panostuksen ja sen palkitsevuuden välillä sekä organisaation epäoikeudenmukaisuus. Tunnistetut työpaikan ihmissuhteisiin ja työympäristöön liittyvät ongelmat erosivat kuitenkin kahden tutkitun somatiikan ympäristön välillä.

Tutkimuksen tulokset osoittavat potilaan aggressiivisen käyttäytymisen monimutkaisien luonteen terveydenhuollossa. Työpaikan ihmissuhteiden tukeminen ja työympäristön kohentaminen voivat tukea potilaan aggressiivisen käyttäytymisen ennaltaehkäisyä terveydenhuollossa. Somatiikan ympäristöt voivat olla haavoittuvaisempia potilaan aggressiiviselle käyttäytymiselle, joka liittyy ongelmiin työpaikan ihmissuhteissa ja työympäristössä. Tutkimusta tarvitaan lisää tämän tutkimuksen tulosten varmistamiseksi.

Avainsanat: Hoitotyö, aggressio, sosio-ekologinen malli, havainnointitutkimus



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## **ABBREVIATIONS**

ALLEA	All European Academies
CDC	Centers for Disease Control and Prevention
CFI	Comparative fit index
Cinahl	Cumulative Index to Nursing and Allied Health Literature
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders 5
ECT	European Credit Transfer and Accumulation System
ETENE	The National Advisory Board on Social Welfare and Health Care Ethics
EU	European Union
EU-OSHA	European Agency for Safety & Health at Work
Eurostat	The Statistical Office of the European Communities
FPS	Finnish Public Sector Study
FIOH	Finnish Institute of Occupational Health
GHQ-12	12-item General Health Questionnaire
GLMM	Generalized Linear Mixed Modeling
ICD-10	International Classification of Diseases-10
ICN	International Council of Nurses
ILO	International Labour Office
JCQ	Job Content Questionnaire
KR20	Kuder-Richardson formula
Mplus	Statistical programme Mplus
N/A	Non-applicable
NICE	National Institute for Health and Care Excellence
NIH	National Institutes of Health
OECD	Organisation for Economic Co-operation and Development
OR	Odds Ratio
OSHA	Occupational Health and Safety Authority
PEI	Prince Edward Island
PSI	Public Services International
R <sup>2</sup>	Coefficient of determination
SuPer	The Finnish Union of Practical Nurses
SEM	Structural Equation Modeling
SPSS	Statistical Package for the Social Sciences
STAI	State-Trait Anxiety Inventory
TCI-14	14-item Team Climate Inventory
THL	National Institute of Health and Welfare

## *Abbreviations*

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TEHY	The Union of Health and Social Care Professionals in Finland
Valvira	National Supervisory Authority for Welfare and Health
WAI	Work Ability Index
WHO	World Health Organization

## **LIST OF ORIGINAL PUBLICATIONS**

The doctoral thesis is based on the following publications, which are referred to in the text by their roman numerals I–IV.

- I Pekurinen V, Willman L, Virtanen M, Kivimäki M, Vahtera J, Välimäki, M. Patient aggression and the wellbeing of nurses: A cross-sectional survey study in psychiatric and non-psychiatric settings. *International Journal of Environmental Research and Public Health* 2017, 14, 1245. doi:10.3390/ijerph14101245.
- II Pekurinen V, Välimäki M, Virtanen M, Kivimäki M, Vahtera J. Work stress and satisfaction with leadership among nurses as correlates patient aggression in psychiatric care: a cross-sectional survey study. *Resubmitted*.
- III Pekurinen V, Välimäki M, Virtanen M, Salo P, Kivimäki M & Vahtera J. Organizational justice, collaboration between nurses and stress as correlates of violent assaults by patients in psychiatric inpatient care: a structural equation model analysis. *Psychiatric Services* 2017 68(5):490-496. doi: 10.1176/appi.ps.201600171.
- IV Pekurinen V, Välimäki M, Lantta T, Anttila M, Katajisto J, Virtanen M, Kivimäki M, Vahtera J. Problems in psychosocial work environment among nurses as correlates of patient aggression in psychiatric and non-psychiatric settings: a prospective cohort study. *Manuscript*.

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## 1 INTRODUCTION

Patient aggression towards healthcare professionals is a global challenge (WHO 2018). Nurses are more frequently exposed to aggression compared to other professions (Ferri et al. 2016). Aggression can be defined as behavior that potentially harms, hurts or injures a person (by another person), verbally or physically, regardless of whether the harm is intentional or actually sustained (NICE 2015). The most commonly reported type of patient aggression is non-physical, while physical aggression is reported by a smaller number of nurses (Kowalzuk et al. 2017). The occurrence of patient aggression varies between nursing specialties, but among the top are psychiatric and emergency settings (Magnavita & Heponiemi 2012, Spector et al. 2014, Edwards et al. 2016). Those working in medical and surgical settings are less exposed to patient aggression in their job (Esthryn-Behar et al. 2008, Magnavita & Heponiemi 2012). The consequences of patient aggression can be severe for nurses and may include depression (da Silva et al. 2015), burn-out (Yang et al. 2018, Viotti et al. 2015, Hamdan & Hamra 2017), leaving the profession (Esthryn-Behar et al. 2008), physical injuries or even death (Staggs 2015). However, the occurrence and severity of consequences may vary between psychiatric and non-psychiatric specialties (Merecz et al. 2006).

Traditionally, patient aggression has been explained by the characteristics of the patients treated in healthcare services (see e.g. Dack et al. 2013, Steward & Bowers 2013). Studies suggest that certain characteristics—for example, being of the male gender (Dack et al. 2013), having a severe mental disorder (Amoo & Fatoye 2010, Dack et al. 2013) or having a history of aggressive behavior—are associated with patient aggression (Dack et al. 2013, Ekinci & Ekinci 2013, Steward & Bowers 2013). Furthermore, studies have linked a history of substance abuse (Dack et al. 2013, Steward & Bowers 2013), involuntary hospital admission (Cornaggia et al. 2011, Dack et al. 2013) and patients' poor self-reflective skills with increased risk for aggressive behavior (Ekinci & Ekinci 2013). On the other hand, some authors have suggested that patient aggression might be explained partly by other factors that should be taken into consideration (see e.g. Nijman et al. 1999, Cutcliffe & Riahi 2013a).

Some authors have identified the individual characteristics of nurses, as well as their relationship and work environment factors, that may expose the nurses to aggression. For instance, nurses' individual characteristics, such as gender (Kelly et al. 2015, Shea et al. 2017), age (Shafran-Tikva et al. 2017, Stutte et al. 2017) and work experience (Jiao et al. 2015, Cheung et al. 2017), have been associated with exposure to patient aggression. Nurses' negative affectivity (Rodwell et al. 2013) and psychological distress (Magnavita & Heponiemi 2012) have been suggested as individual exposing factors in previous studies. Furthermore, relationship factors, such as poor interpersonal relationships (Camerino et al. 2008) and low support at work (Magnavita & Heponiemi 2012, Magnavita 2013, Magnavita 2014), may play a role in these aggressive incidents, as well. This is supported by findings of low-quality teamwork being connected to an increasing occurrence of aggression (Esthryn-Behar et al. 2008). At the same time, there are factors in work environments, such as stress and busyness (Farrell & Shafei 2012), high job strain (Magnavita & Heponiemi 2012), or poor organizational justice (Park et al. 2013, Magnavita & Heponiemi 2012), that may contribute to the increased occurrence of patient aggression.

Nevertheless, to date, the evidence from previous research regarding the individual characteristics and relationship and work environment factors that expose nurses to patient aggression is mainly cross-sectional (Camerino et al. 2008, Esthryn-Behar et al. 2008, Magnavita & Heponiemi 2012, Farrell & Shafei 2012, Rodwell et al. 2013). The few longitudinal studies conducted have concentrated mainly on longitudinal associations between job strain, social support and aggression, without separating whether the aggression experienced is perpetrated by patients or by co-workers (Magnavita 2013, Magnavita 2014), or without differentiating between medical specialties (Magnavita 2013). Therefore, there is still a lack of knowledge on how the multiple factors in the care environments contribute to the occurrence of patient aggression in different nursing specialties. Given that psychiatric and emergency settings are among the top-risk settings for patient aggression (Camerino et al. 2008, Spector et al. 2014), there is an urgent need to identify the exposing factors especially in these specialties.

The overall aim of this study is to describe factors attributed to nurses—individual characteristics and relationship and work environment factors—that expose them to patient aggression in psychiatric and non-psychiatric specialties (emergency-, and medical and surgical specialties). The information gained in this study can be used to support the prevention of patient aggression in healthcare. The Socio-Ecological Model for prevention of patient-to-worker aggression in hospitals (Arnezt et al. 2015) was used as a theoretical framework in this study. The Socio-Ecological Model suggests that catalysts to patient aggression may arise from factors at four levels: the individual level, relationship level, work environment level and organization level (Arnezt et al. 2015). This thesis concentrates on describing the exposing factors on the first three levels of the model, operationalized from a nurse’s perspective. Individual characteristics included factors such as demographics, negative affect and psychological distress. Relationship-level factors included nurses’ perceptions of workplace social capital, team climate/collaboration and satisfaction with leadership. The work environment level here refers to the non-physical work environment (characteristics of the job), which includes job strain, effort-reward imbalance, job insecurity, participation in decision making, and organizational justice. The factors at these levels are explored first through cross-sectional designs and, second, through a longitudinal design.

This dissertation is based on experiences of the project, ‘Coping at work among psychiatric nurses in occurrence of violence with patients,’ funded by the Finnish Work Environment Fund (111298, 2012-2013), and is part of the project, ‘The effectiveness of user-driven intervention to manage patient aggression in mental health services,’ funded by the Academy of Finland (projects 294298, 307367, 2015-2020), which aims to develop innovative interventions to manage patients’ aggressive events in psychiatric hospitals. The thesis uses the Finnish Institute of Occupational Health’s (FIOH) Finnish Public Sector Study data of nurses who participated in the study in 2011–2012 and 2015 (FPS, see e.g. Kivimäki et al. 2010).

This is a multidisciplinary study, and this thesis has been conducted in the discipline of Nursing Science. Three of the four main concepts of the nursing metaparadigm (person, environment, health and nursing; Fawcett 1984) are considered in this study and are defined as follows: The individual (*person*) in this study is a nurse, with the occupational qualification of practical nurse, registered nurse, or the equivalent (Finnish Nurses Association 2018). The care environments (*environment*) here are psychiatric and non-psychiatric care environments (THL 2017a). The non-psychiatric care environments are considered separately as emergency

environments, and medical and surgical environments (i.e., somatic care environments other than emergency environments), because emergency environments are considered separately in guidelines for prevention of aggression in healthcare (NICE 2015, WHO 2018). The focus of interest is patient aggression (*health*) that is characterized by assaults on ward property (throwing or breaking objects), mental abuse (such as verbal threats), physical assaults (e.g. hits or kicks) and armed threats (such as threats with an edged weapon or firearm; see Virtanen et al. 2011, Pekurinen et al. 2017). Patient aggression is understood as a multidimensional phenomenon that results from a combination of many different factors (Arnetz et al. 2015).

## 2 BACKGROUND OF THE STUDY

This chapter provides the key literature related to the topic of the doctoral thesis. The chapter sets the stage for the description of the factors that can expose nurses to patient aggression in psychiatric and non-psychiatric settings (emergency or medical and surgical specialties). First, the context of this study is described by providing details on organization, use and workforce of specialized healthcare services in Finland. Second, the regulations and guidelines for prevention of aggression in the workplace are described. Third, different definitions of aggression and models explaining patient aggression in healthcare are described. Fourth, the extent of the problem is described by providing details of the occurrence and the consequences of aggression in healthcare. Finally, key literature related to nurses' individual, relationship and work environment characteristics that can expose nursing staff to patient aggression are described. Appendix 1 summarizes the process of identification of the key literature.

### 2.1 Organization, use and workforce of specialized healthcare in Finland

In Finland, specialized medical healthcare is mostly funded through taxes (Pekurinen 2014), and the expenditure was 6.9 billion euros in 2015 (THL 2017b). Most hospitals in Finland are public, owned by joint municipal authorities or municipalities. The municipalities are responsible for assuring that persons in the municipality receive necessary specialized medical care. Each municipality belongs to one of 20 hospital districts. Specialized healthcare is organized and provided by these 20 hospital districts. Central hospitals and university hospitals of the hospital districts are responsible for the most demanding medical operations (Ministry of Social Affairs and Health 2018). Specialized medical care can be divided into psychiatric specialized medical care and somatic specialized medical care (THL 2017a). Psychiatric specialized medical care consists of various psychiatric specialties, excluding the mental health services provided in primary healthcare (THL 2018). Somatic specialized medical care consists of medical and dental care services, which aim to prevent, diagnose, and treat illnesses, emergency medical services and care, and medical rehabilitation. The treatment provided is at the level of medical specialists (THL 2017a). Table 1 shows the laws and decrees regulating specialized medical care in Finland.

**Table 1.** Laws and decrees regulating specialized medical care in Finland

Year	Law/Decree	
2010	Health Care Act	1326/2010
1989	Act on Specialized Medical Care	1062/1989
2011	Government Decree on the healthcare provision plan and the agreement on the provision of specialized medical care	337/2011
2011	Government Decree on the organization and centralization of highly specialized medical care	336/2011
1992	Act on the Status and Rights of Patients	17.8.1992/785
1990	Mental Health Act	1116/1990

The Ministry of Social Affairs and Health is responsible for the planning, monitoring and steering of specialized medical care at the national level (Ministry of Social Affairs and Health 2018). The Ministry collaborates with other Finnish agencies (Ministry of Social Affairs and Health 2018), such as the National

Institute of Health and Welfare (THL 2017c), the National Supervisory Authority for Welfare and Health (Valvira 2015a) and the Regional State Administrative Agencies (Ministry of Social Affairs and Health 2018). The National Institute of Health and Welfare serves as the expert agency for specialized medical care and collects statistics on the provided services (Ministry of Social Affairs and Health 2018). The National Supervisory Authority for Welfare and Health (Valvira 2015a) and the Regional State Administrative Agencies (Ministry of Social affairs and Health 2018) plan, steer and monitor the provision of services.

The number of inpatients treated in both psychiatric (THL 2018) and somatic specialized medical care (THL 2017a) has declined over the past decade. First, the number of patients treated as well as the number of care periods in psychiatric inpatient units declined in psychiatric specialized medical care from 2007 to 2016. The number of patients treated was 177,839 in psychiatric specialized medical care in 2016. Of these, the number of patients in outpatient care was 174,052 and in inpatient care, 23,242 (2016). The most common diagnoses (ICD-10) in psychiatric specialized care were schizophrenia (schizophrenia, schizotypal and delusional disorders), followed by mood disorders, and neurotic, stress-related and somatoform disorders (THL 2018). Second, regarding somatic specialized medical care, the number of patients treated in outpatient services has increased (20%), while the number of inpatients has declined between 2006 and 2016 (43%). In 2016, 1.8 million patients were treated in somatic specialized medical care. That same year, 625,000 patients were treated in inpatient units, and these patients had 940,000 care periods. However, from 2006 to 2016, the number of care periods that started as emergency visits fluctuated, with no clear declining or increasing trend in these care periods. Overall, the highest numbers of patients were treated in surgery, internal medicine, acute medicine, ophthalmology as well as gynecology and obstetrics, while the most common diagnoses (ICD-10) were diseases of the musculoskeletal system and connective tissue, injuries, poisonings and specific other consequences of external causes, diseases of the circulatory system and tumors. (THL 2017a.)

Of the OECD-countries, Finland is among the top-third in health spending on active nurses per capita (5<sup>th</sup> highest). Regarding health spending on active doctors, Finland is among the middle-third of the OECD-countries (20<sup>th</sup>) (OECD 2015). The number of qualified physicians, registered nurses, midwives, public health nurses and practical nurses increased in the 2000s (THL 2015). Consequently, the number of physicians was 3.3 per 1,000 people and 14.1 nurses per 1,000 people (2012). The number of nurses per 1,000 people is among the highest of the OECD countries, while the number of doctors per 1,000 people is at mid-level among OECD countries (OECD 2014). However, the number of healthcare assistants per 100,000 people was considerably higher than in other EU Member States in 2014 (Eurostat 2017).

Overall, in Finland, education for nursing personnel is provided at two different levels. Secondary schools (vocational education) educate practical nurses (Finnish National Board of Education 2011), while polytechnics (universities of applied sciences) are responsible for educating registered nurses, paramedics, public health nurses and midwives (Finnish Nurses Association 2018). Nursing education tracks given at polytechnics (e.g. registered nurses, paramedics) is longer than those at vocational schools (practical nurses) (for polytechnics 3.5 years–4.5 years [Finnish Nurses Association 2018], for practical nurses approximately 2.5 years [Studentum 2018]). Nursing qualifications obtained from polytechnics are equivalent to a bachelor's degree (Ministry of Education and Culture 2006). Regarding education given in vocational schools, there are two options for obtaining qualification: curriculum-based or competence-based (Finnish National Board of

Education 2011). Both options include same professional competencies; the only difference is the mode of study (SuPer 2018a). Practical nursing education grants students eligibility to continue their studies at universities or polytechnics (Act on Vocational Education 630/1998).

Registered nurses, paramedics, public health nurses and midwives are licensed professionals, and the practice of the profession is restricted to these professionals only. Regarding practical nurses, the title is a protected occupational title, which means that practical nursing work can also be done by a person without the professional title if they have the required professional skills (Valvira 2015c). Continuing education of these professionals is stipulated by law (Act on Health Care Professionals 559/1994). However, there are no strict regulations about the continuing education hours per year for nurses (Ministry of Social Affairs and Health, Decree 1194/2003). Nevertheless, SuPer, the trade union of the practical nurses, for example, recommends 3–10 days of continuing education per year (SuPer 2018b), which is the same as the recommendation given by the health and social care staff's trade union TEHY (TEHY 2018).

## 2.2 Regulations and guidelines related to aggression in healthcare

In Finland, occupational safety and preventing workplace aggression is regulated by law. The Regional State Administrative Agencies aim to strengthen implementation of the laws to provide healthy and safe working conditions (Regional State Administrative Agencies 2015). There are several laws and decrees regulating occupational safety (Table 2), but the most relevant law related to prevention of workplace aggression is in the Occupational Safety and Health Act (738/2002).

**Table 2.** Laws and decrees related to workplace aggression

Year	Law/Decree	
2002	Occupational Safety and Health Act	738/2002
2011	Criminal Code of Finland	441/2011
2001	Occupational Healthcare Act	21.12.2001/1383
1993	Young Workers' Act	998/1993
2001	Government Decree on medical examinations in work that presents a special risk of illness	1485/2001
1948	Employment Accidents Insurance Act	608/1948
1987	Coercive Measures Act	30.4.1987/450

The purpose of the Occupational Safety and Health Act (738/2002) is to enhance the working conditions and work environments to ensure and maintain a good work capacity for employees. The law aims to prevent occupational accidents, diseases and other hazards related to work that can threaten employees' physical and mental health (Occupational Safety and Health Act 738/2002). The law especially takes into account the following aspects of maintaining employee health and safety: employers' general duty to exercise care (§8), analysis and assessment of the risks at work (§10), work that causes particular risks (§ 11), design of the working environment (§12), work design (§13), instruction and guidance to be provided for employees (§14), providing personal protective equipment, auxiliary equipment and other devices for use (§15), employees' general obligations (§18), threat of violence (§ 27) and working alone (§ 29).

There are several international and national guidelines addressing aggression in the workplace in addition to laws regulating the issue. At the international level, the International Labour Office (ILO), World Health Organization (WHO), International Council of Nurses (ICN) and Public Services International (PSI) have together constructed “Framework guidelines for addressing workplace violence in the healthcare sector” (ILO et al. 2002). Based on this joint effort, a training manual for prevention of aggression in healthcare sectors was also developed (ILO et al. 2005). The European Agency for Safety and Health at Work gives recommendations for the prevention of workplace aggression, as well (EU-OSHA 2011). At the national level, the Ministry of Social Affairs and Health has constructed a guideline for promoting safety and risk management in health and social services (Ministry of Social Affairs and Health 2011). The Regional State Administrative Agency (2013) gives recommendations on handling the threat of aggression in the workplace. Furthermore, other nations have their recommendations for prevention of aggression, such as the United States (OSHA 2016), Canada (Workers Compensation Board of PEI 2011), and the United Kingdom (Design Council & Department of Health 2011).

In the guidelines, the importance of a systematic and methodical approach to aggression prevention is emphasized (ILO et al. 2002, Workers Compensation Board of PEI 2011, The Ministry of Social Affairs and Health 2011, OSHA 2016). The guidelines give instructions on how to evaluate the occurrence and risk of aggression and how to utilize the information in its prevention (ILO et al. 2002, Workers Compensation Board of PEI 2011, OSHA 2016). Importance of training both frontline (ILO 2002, Workers Compensation Board of PEI 2011, Ministry of Social Affairs and Health 2011) and administrative staff (ILO 2002, OSHA 2016) is emphasized. Also, guidelines address the implementation aggression management plans and their evaluation (ILO et al. 2002). Several guidelines address the importance of the development of the physical environment of the work units to enhance safety (ILO et al. 2002, Workers Compensation Board of PEI 2011, Design Council & Department of Health 2011, OSHA 2016). However, the “Framework guidelines for addressing workplace violence in the healthcare sector” (ILO et al. 2002) also gives recommendations that include, for example, changes in staffing, management styles (e.g. open communication), changes in work practices (e.g. prevention of overcrowding) and job design (e.g. ensuring appropriate degree of autonomy and opportunities for skill development, prevention of work overload and excessive work pace). Recommendations are also given for interventions after an aggressive incident (ILO et al. 2002), an issue emphasized in other guidelines, too (e.g. Ministry of Social Affairs and Health 2011, NICE 2015, OSHA 2015). Furthermore, the ICN (2007) has constructed a separate guideline for coping with these incidents.

### **2.3 Definitions and models explaining aggression in healthcare**

Many different definitions for aggression exist. The World Health Organization (Dahlberg & Krug 2002) defines aggression as the intentional use of physical power or force, actual or threatened, against another individual, against a community or group of people, or oneself. The International Labour Organization (ILO 2004) and National Institute of Health and Care Excellence (NICE 2015) have also proposed definitions for workplace aggression. These definitions are described in Table 3.

**Table 3.** Different definitions of aggression

Source	Definition
Dahlberg & Krug 2002	<ul style="list-style-type: none"> <li>• Intentional use of physical power or force: either has a high probability (or results in) psychological harm, injury, mal-development, deprivation or even death</li> <li>• Associates the intentionality with the committing of the violent act, irrespective of its outcomes</li> <li>• Divides the types of violence in categories based on the perpetrator: self-directed violence, collective violence and interpersonal violence</li> <li>• Further divided into four different types of violence: psychological, physical, sexual and acts involving deprivation or neglect</li> </ul>
ILO 2003, 2013	<ul style="list-style-type: none"> <li>• Any actions, behaviors or incidents that differ from reasonable conduct in which an individual is harmed, threatened, assaulted, or injured as a direct result or in the course of their work</li> <li>• Occur at the workplace, regardless of the type of perpetrator (customer, co-worker, supervisor or stranger) (ILO 2003)</li> <li>• Divided broadly into psychological, physical and sexual violence (ILO 2013)</li> </ul>
NICE 2015	<ul style="list-style-type: none"> <li>• Aggression can be defined as behavior that potentially harms, hurts or injures a person (by another person), verbally or physically</li> <li>• Irrespective of whether the harm is intentional or actually sustained</li> </ul>

In this study, aggression is defined as patient aggression that is characterized by assaults on ward property (throwing or breaking objects), mental abuse (for example, verbal threats), physical assaults (e.g. hits or kicks) and armed threats (such as threats with an edged weapon or firearm; see Virtanen et al. 2011, Pekurinen et al 2017).

The occurrence of patient aggression has been explained by a number of models, traditionally involving the characteristics of the patients treated in healthcare services, such as severe mental disorder (Dack et al. 2013) or substance abuse (Steward & Bowers 2013). However, some models, including the Model of Patient Aggression in Psychiatric Hospitals (Nijman et al. 1999, Nijman 2002), the Cyclical Model of Violence (Whittington & Wykes 1994), the Systemic Approach to Patient Aggression in Mental Healthcare (Cutcliffe & Riahi 2013a, Cutcliffe & Riahi 2013b) and the Socio-Ecological Model (e.g. Gillespie et al. 2015, Arnezt et al. 2015), suggest that patient aggression could be explained by other factors (see e.g. Nijman et al. 1999, Cutcliffe & Riahi 2013a).

**The Model of Patient Aggression in Psychiatric Hospitals** (Nijman et al. 1999, Nijman 2002) proposes that certain patient, staff and unit characteristics may interact in causing patient aggression. Patient characteristics include both psychopathology (such as mental illness), and cognitive distortions (e.g. perceptions of a situation, incorrect interpretations, such as “they are poisoning me with pills”). The staff variables include, for example, problematic communication with patients, such as inconsistency in limit setting and explaining unit rules, and challenges in getting information from staff from the perspective of the patient. Unit variables refer to environmental stressors, such as overstimulation on crowded wards, little privacy, locked facilities and exposure to therapies that the patient is not ready for. The interaction of these various patient, staff and unit-related characteristics is proposed to cause aggressive incidents. The model also proposes that repeated patient aggression may result from a vicious cycle; in other words, patient aggression is usually followed by an increase in environmental and/or communication stress on the patient, and therefore, the risk of a repeated outburst of aggression is increased (Nijman 2002).

**The Cyclical model of violence** (Whittington & Wykes 1994) proposes a cyclical nature of patient aggression, where nursing staff stress caused by exposure to aggression leads to weakened staff performance and adoption of behaviors that increase the likelihood of the re-occurrence of patient aggression. More specifically, when a nurse is exposed to aggression by patients, they experience a stress reaction (anxiety, burnout, post-traumatic stress). This can impair the nurse's ability to interpret patient behavior correctly, which may lead to an inappropriate selection of nursing interventions. Feeling stressed can also affect a nurse's behavior towards patients by means of avoiding patient contact or being hostile. This kind of nurse behavior may be experienced as aversive or frustrating to patients, and can lead to, e.g., physical pain or psychological distress for patients. These reactions caused by nurse behavior can lead to aggressive incident. The essence of this model is its circularity (Whittington & Wykes 1994).

**The Systemic perspective of violence and aggression in mental healthcare** (Cutcliffe & Riahi 2013a, Cutcliffe & Riahi 2013b) proposes that patient aggression is the result of contributing phenomena in four categories. These phenomena are client-related, clinician-related, mental healthcare system-related and environment-related. First, the client-related phenomena refer to, e.g., demographic characteristics, cognitive state, emotional state, previous learned responses to threat or unmet demands, malevolence, and impaired self-control skills. Clinician-related phenomena include communication and de-escalation skills, level of burnout or stress, and participation in clinical supervision. Environmental-related phenomena refer to the physical environment, such as noise level, ambiance of the unit, individual space needs, locked doors, degree of privacy, and structure/layout of the unit. Finally, the mental healthcare-related phenomena include mental health policy (e.g. zero tolerance, control orientation), hospital or care unit policies and rules, and societal views and attitudes towards clients with program engagement. The systemic model proposes that the phenomena in these different categories together contribute to the occurrence of patient aggression (Cutcliffe & Riahi 2013a, Cutcliffe & Riahi 2013b).

**The four-level Socio-Ecological models** have been used to explain aggression and violence on different levels. For example, the World Health Organization has used the model to explain sexual violence, collective violence and violence towards the elderly (Dahlberg & Krug 2002). Also, the CDC (2018) has utilized the four-level model to understand (and plan the prevention of) societal violence. The Socio-Ecological model suggests that aggression is complicated, and results from a combination of multiple factors on a person's behavior. The model assumes that aggression can be understood by how individuals relate to those around them and to their broader environment. (CDC 2018.) Socio-ecological models have been used to explain and plan the prevention of aggression in psychiatric care (Hamrin et al. 2009, Gillespie et al. 2015) and in hospitals in general (Arnetz et al. 2015). However, the definitions and names of these levels vary (see Hamrin et al. 2009, Arnetz et al. 2015, Gillespie et al. 2015). The Socio-Ecological Model for the prevention of patient aggression in hospitals by Arnetz et al. (2015), which is the theoretical framework of this study, suggests that factors contributing to patient aggression arise at the individual level, relationship level, work environment level and organization level. The levels are defined as follows: 1) the individual level includes characteristics of healthcare workers and/or patients (such as patient cognitive impairment), 2) the relationship level includes factors influencing relationships between healthcare workers and/or patients during the process of care (e.g. problems in the communication between patients and staff), 3) the work environment level includes factors in the work environment (e.g. high workload), and 4) the organization level includes factors in the organization,

such as a hospital or hospital system (hospital policies regarding workplace aggression and patient and employee safety) (Arnez et al. 2015). In the model, the individual, relationship and work environment factors are embedded in the fourth level, organization. Patient aggression may be the result of a combination of many different factors on the various levels, and thus may require interventions on multiple levels (Arnez et al. 2015).

## **2.4 Occurrence, characteristics and consequences of aggression in healthcare**

Compared to other healthcare professionals, nurses seem to be more frequently exposed to aggression (Ferri et al. 2016). Worldwide, a little over half (51%) experience different types of aggression in their workplace (Spector et al. 2014). The most frequently experienced type of aggression is non-physical aggression (67%), followed by bullying (37%), physical assault (36%) and sexual harassment (28%) (Spector et al. 2014). The perpetrators of aggression are, again, mainly patients (62%; Spector et al. 2014). Regarding physical aggression, over two-thirds are perpetrated by patients, while almost one-third of the perpetrators are their family or friends, and less than 10% are perpetrated by other staff (Spector et al. 2014). The most commonly reported type of patient aggression is non-physical aggression, while physical aggression is reported by a smaller number of nurses (Kowalzik et al. 2017). However, differing results have been reported; Spector et al. (2014) found that physical aggression was the most common type (64%), followed by non-physical aggression (54%). The rates and perpetrators of aggression seem to vary between global regions. Nevertheless, in Europe, the most common type is non-physical aggression (60%), while the most common perpetrator is a patient. The frequency of aggression experienced by nurses, however, varies between individual studies (Spector et al. 2014).

The order of nursing fields most at risk for experiencing patient aggression also varies between studies (see e.g. Spector et al. 2014, Camerino et al. 2008). According to Edwards et al. (2016), psychiatric settings are most at risk for patient aggression. A quantitative review by Spector et al. (2014) identified psychiatric, geriatric and emergency settings as the highest risk settings for patient aggression. On the other hand, a Europe-wide study identified the highest risk settings in a different order, as follows: psychiatric, emergency and geriatric settings (Camerino et al. 2008). Nevertheless, although the order of the high-risk nursing fields varies, nurses working in psychiatric and emergency settings seem to be included in the top risk settings in several studies (Camerino et al. 2008, Spector et al. 2014, Magnavita & Heponiemi 2012, Edwards et al. 2016), while nurses in medical and surgical specialties seem to be less exposed to patient aggression in their jobs (Eshtryn-Behar et al. 2008, Magnavita & Heponiemi 2012). Individual studies describe the following percentages for experiences of aggression by setting: for psychiatric settings, 94.6% (Yang et al. 2018); emergency settings, 75% (ALBashtawy et al. 2016); and for general hospital settings, 66% in cases of non-physical aggression and 27% in cases of physical aggression (Spector et al. 2014).

Experiencing aggression has negative consequences on staff health and wellbeing. These consequences might include psychological harm (see e.g. Itzhaki et al. 2015, Hamdan & Hamra 2017), physical injuries (Spector et al. 2014, Staggs 2015) or even death (Staggs 2015). Regarding psychological harm, studies have described negative feelings such as vulnerability (Gabrovec & Erzen 2016), fear (Mikkola et al. 2017, Gabrovec & Erzen 2016), guilt (Needham et al. 2005) and insecurity (Gabrovec & Erzen 2016) after exposure to aggression. Studies have also reported low self-assessed health (Sun et al. 2017), depression (da Silva et al. 2015,

Magnavita 2013), psychological stress (Sun et al. 2017), burn-out (Yang et al. 2018, Viotti et al. 2015, Hamdan & Hamra 2017), poor sleep quality (Sun et al. 2017) and anxiety (Magnavita 2013) after exposure to aggression. Experiencing frequent aggression from patients might even cause some aspects of post-traumatic stress disorder (Lee et al. 2015). The psychological consequences may vary between the type of aggression. For example, Hamdan & Hamra (2017) found that exposure to physical violence was significantly associated with having a high degree of burnout, whereas such an association was not found regarding verbal aggression. There may also be differences in the consequences of patient aggression on wellbeing among various nursing specialties; one study has reported findings of an association between experiences of aggression and psychological distress in non-psychiatric nurses, whereas such an association was not found in cases of psychiatric nurses (Merecz et al. 2006). Regarding physical injuries, physical or bodily trauma as a result of workplace aggression is reported by 40% of nurses (Egerton-Warburton et al. 2016). In a study conducted in psychiatric units of 345 hospitals in the UK (2007–2013), most of the injuries (80%) caused by assaults were minor injuries, followed by moderate injuries (12%) and major injuries (2%) (Staggs 2015).

## **2.5 Factors that expose staff to patient aggression in healthcare**

This section provides key literature related to the exposing factors of patient aggression. The factors attributed to staff—individual characteristics and relationship and work environment factors—are presented here in the context of the first three levels of the Socio-Ecological Model for prevention of patient-to-worker aggression in hospitals (Arnezt et al. 2015), which is the theoretical framework of this study. Further, a summary of and gaps in the current literature are described.

### **2.5.1 Individual factors that expose staff to patient aggression in healthcare**

Several studies have investigated the association between nurses' demographic characteristics and patient aggression (see e.g. Esthryn-Behar et al. 2008, Kelly et al. 2015, Shea et al. 2017, Shields & Willkins 2009). However, the demographic characteristics that are associated with increased experiences of aggression in healthcare vary between studies (see e.g. Shea et al. 2017, Shafran-Tikva et al. 2017).

There are several reports on associations between staff members' gender and exposure to aggression (e.g. Abed et al. 2016). Some studies have identified an increasing occurrence of aggression in female nurses (Abed et al. 2016, Chen et al. 2009, Zampieron et al. 2009), while other studies have identified this type of association between the male gender and aggression (Esthryn-Behar et al. 2008, Kelly et al. 2015, Shea et al. 2017, Shields & Willkins 2009). There might be differences in the increasing occurrence of aggression by the type of aggression; Edward et al. (2016) identified that the odds to experience verbal abuse were 21% greater for female nurses than males, whereas the odds for males to experience physical assault were about 18% greater compared to female nurses (Edward et al. 2016). However, some studies have even reported non-significant associations between staff members' gender and experiences of assaults (Shafran-Tikva et al. 2017, Gillespie et al. 2017).

According to previous studies, the age of nurses might also be associated with their experiences of aggression (see e.g. Esthryn-Behar et al. 2008, Stutte et al. 2017). Research has mainly shown that younger nurses are more exposed to aggression (Camerino et al. 2008, Esthryn-Behar et al. 2008, Hamdan & Hamra 2015, Jaradat

et al. 2016, Shafran-Tikva et al. 2017, Stutte et al. 2017). For example, Hamdan & Hamra (2015) identified an increasing occurrence of physical assaults among nurses who were 30 years old and younger, while other researchers have detected similar results in nurses aged 35 and younger regarding physical assaults and verbal abuse (Jaradat et al. 2016). For every added year in age, the risk of exposure to aggression has been found to decrease by 4% (Shafran-Tikva et al. 2017). However, also slightly differing results have been reported; Chen et al. (2009) observed an increasing occurrence of both physical assaults and verbal abuse in nurses younger than 30 years, but also older than 44 years. There are also studies that have reported non-significant associations between the age of nurses and their experiences of aggression (Shea et al. 2017).

Previous research also suggests that nurses' work experience, either overall (Shields & Wilkins 2009, Park et al. 2015, Jiao et al. 2015, Cheung et al. 2017) or in a specific unit (Chen et al. 2009, Chen et al. 2010, Chen et al. 2011) might be associated with experiences of aggression. Mainly, studies have observed a decreasing occurrence of aggression related to an increase in work experience (Shields & Wilkins 2009, Chen et al. 2009, Chen et al. 2010, Chen et al. 2011, Jiao et al. 2015, Cheung et al. 2017). For example, Cheung et al. (2017) found that those who had less than 10 years of experience were at greater risk of experiencing aggression, while other researchers have detected similar results regarding less than 5 years of work experience (Jiao et al. 2015). However, opposite results have been reported; Park et al. (2015) detected an increase in the likelihood for the occurrence of aggression in those who had more than 3 years of work experience, compared to those with less than 3 years of experience. There are even reports of a non-significant association between work experience and the occurrence of aggression (Kelly et al. 2015).

According to previous investigations, there are associations between professional status (Esthryn-Behar et al. 2008, Shea et al. 2017, Gillespie et al. 2017) or the level of education of nurses (Chen et al. 2009, Jiao et al. 2015) and experiences of aggression. Regarding professional status, researchers have detected an increased risk of experiencing aggression for nursing aides (Esthryn-Behar et al. 2008) and enrolled nurses (Shea et al. 2017) compared to registered nurses. When registered nurses have been compared to, e.g., paramedics, emergency medical technicians and patient care assistants, an elevated likelihood for experiencing aggression has been observed for registered nurses (Gillespie et al. 2017). College (Chen et al. 2009) and graduate-level educated staff (Jiao et al. 2015) have been found to be more likely to experience aggression compared to professionals with a lower level of education. It is possible that the exposure to aggression is explained by the degree of patient contact in different professional and education level groups, as the increase in the degree of patient contact has been found to increase exposure to patient aggression (Findorff et al. 2004). Kelly et al. (2015) detected an increase in assaults in ward staff members, compared to clinical staff (e.g. psychologists and psychiatrists) and supervisory staff. However, in accordance with previous study results regarding demographic characteristics, non-significant associations between the level of formal education and professional status have also been reported (Zampieron et al. 2009).

Reports have also been published about the associations between working times (see e.g. Shields & Wilkins 2009, Cheung et al. 2017) and length of working hours (Findorff et al. 2004), and experiences of aggression. Mainly previous investigations have observed a lower likelihood for nurses who work in the daytime to experience aggression compared to other working times (Shields & Wilkins 2009, Camerino et al. 2008, Esthryn-Behar 2008, Jiao et al. 2015, Cheung et al. 2017). Shift-working nurses, and those working night shifts

are more often exposed to aggression (Camerino et al. 2008, Esthryn-Behar 2008, Jiao et al. 2015, Cheung et al. 2017). According to Jiao et al. (2015), those working rotating shifts are almost 4 times more likely to experience physical assaults and almost 2 times more likely to experience non-physical assaults, compared to fixed day-shift workers. Having between 20 and 39 weekly work hours has shown elevated odds for experiences of aggression (Findorff et al. 2004). Further, working part-time seems to protect nurses from experiencing aggressive incidents (Eshtryn-Behar et al. 2008).

Some previous studies have suggested that certain other individual characteristics of nurses might expose them to experiences of aggression (see e.g. Bilgin et al. 2009, Kelly et al. 2015), although research is scarce compared to the amount of research related to demographic characteristics. For example, negative affectivity (i.e. individuals' tendency to react by becoming more distressed, nervous and upset even in the absence of a stressor compared to those with more positive affect; see e.g. Watson & Clark 1984) has been associated with an increased occurrence of threats of assault among frontline nurses (Rodwell et al. 2013). A similar association has been detected in nursing administrators regarding emotional abuse (Rodwell et al. 2013). Van Bogaert et al. (2009) and Bowers et al. (2009) have found an increasing occurrence of aggression related to healthcare staff burn-out. Other researchers have detected associations between emotional exhaustion (Stutte et al. 2017), psychological distress (Magnavita & Heponiemi 2012) and increased exposure to patient aggression. Also, anxiety and worry about experiencing aggression have been associated with an increased occurrence of aggression (Chen et al. 2009, Chen et al. 2011, Jiao et al. 2015, Cheung et al. 2017). Furthermore, aggression experiences have been found to be more frequent among tired nurses (Zampieron et al. 2009).

The aforementioned associations can possibly be explained by the findings of another study, which detected a decreasing occurrence of patient aggression among nurses who were generally calm and had a better capacity of staying calm, even under provocation (Bilgin et al. 2009). However, differing results have been reported, suggesting that high staff stress reactivity to social conflict, feeling affected, upset or irritated are associated with less frequent assaults by patients (Kelly et al. 2015). Nevertheless, researchers have explained the associations between these types of nurses' characteristics and experiences of aggression previously by their possible effect on staff behavior; staff might be distracted, and therefore may be impatient when coping with patients or neglect early signs of aggression (Chen et al. 2010, Magnavita et al. 2013).

The abovementioned studies are mainly cross-sectional by nature, and therefore, conclusions about causal relationships cannot be drawn. Two longitudinal studies in this subject have been conducted (Chen et al. 2010, Magnavita 2013). Chen et al. (2010) conducted a prospective longitudinal repeated measures study, in which they detected that a worsened psychological quality of life may increase the risk of being physically assaulted. Furthermore, they also found that worrying about being assaulted may increase the risk of being assaulted (Chen et al. 2010). Another longitudinal study by Magnavita (2013) observed an association between anxiety and depression at baseline and increased occurrence of aggression at the follow-up.

### ***2.5.2 Relationship factors that expose staff to patient aggression in healthcare***

Some authors have investigated the possible contribution of poor relationships between staff in the workplace to patient aggression (see e.g. Camerino et al. 2009, Kelly et al. 2015). Poor interpersonal relationships have been associated with an increased occurrence of aggression (Camerino et al. 2008). Esthryn-Behar et al. (2008)

detected that an increased occurrence of aggression is linked with a poor and medium quality of teamwork. Also, low overall support at one's workplace (Magnavita & Heponiemi 2012, Magnavita 2013, Magnavita 2014), as well as low co-worker (Shields & Wilkins 2009) and supervisor support (Findorff et al. 2004, Shields & Wilkins 2009), have been associated with an increased occurrence of aggression. Poor working relations with physicians have been associated with the increasing occurrence of patient aggression (Shields & Wilkins 2009). Likewise, greater supervisor support for safety might reduce the risk for patient aggression (Shea et al. 2017). However, differing results have been reported; Park et al. (2015) detected an increased occurrence of aggression connected with higher mutual trust between employees.

Some studies have even reported findings that suggest that conflicts between staff members (Kelly et al. 2015) and workplace aggression between staff members (Kvas & Seljak 2015) might contribute to the occurrence of patient aggression in the workplace. Kelly et al. (2015) found that intra-staff conflict, i.e. difficulties working with particular nurses in the unit, disagreements about treatment of patients, and conflicts with supervisors, is associated with an increased occurrence of physical assaults. Some authors have even reported findings of associations between verbal and physical aggression between nurses and an increased occurrence of patient aggression (Kvas & Seljak 2015). Similar associations have been found between verbal and physical aggression between nurses and physicians, and patient aggression (Kvas & Seljak 2015). There is also a published report linking harassment from supervisors and increased odds for patient aggression (Eshtryn-Behar et al. 2008).

The abovementioned studies are mainly cross-sectional by nature, and therefore conclusions about the causal relationships cannot be drawn. Two longitudinal studies have been conducted in this area (Magnavita 2013, Magnavita 2014). Magnavita (2013) found that low social support at the workplace at baseline increased the odds for physical and verbal aggression in the ensuing follow-up year in public healthcare facilities in Italy. The results were partly replicated in a longitudinal study conducted in a hospital for infectious diseases; low social support at baseline was associated with increased verbal aggression in the ensuing year (Magnavita 2014).

### **2.5.3 *Work environment factors that expose staff to patient aggression in healthcare***

Previous research suggests that stressful and busy work environments may be associated with an increased occurrence of aggression in the workplace (Farrel et al. 2012). Increased odds for verbal aggression have been detected in relation to higher workloads (van Bogaert et al. 2009). A higher pace and higher volumes of the workload seem to be associated with an increased number of experiences of aggression (Shea et al. 2017). Tight time constraints (Camerino et al. 2008, Esthryn-Behar et al. 2008) and increased physical loads of work (Esthryn-Behar et al. 2008) have also been detected to increase the odds for aggression. For example, Park et al. (2015) observed a 2% increase in experiences of aggression when nurses' perceptions of the work pace increased by 1 point (out of 100 points). Moreover, frequent interruptions in work tasks (Esthryn-Behar et al. 2008) and lower perceptions of resource adequacy and staffing levels (Stutte et al. 2017) have also been associated with more frequent experiences of aggression.

Job strain and its' components have been found to be associated with an increased occurrence of aggression (see e.g. Magnavita & Heponiemi 2012). Job strain has been defined as a combination of two components:

high demands and low control in a job. The demands of a job refer to its quantitative workload, and control here refers to the degree to which an employee is able to decide on the tempo, amount and method of work as well as opportunities for variation in the work, where the employee can use competencies obtained and learn new things (Karasek & Theorell 1990). For example, Rodwell et al. (2013) detected an increasing occurrence of verbal abuse in relation to higher job demands among the nursing staff. This finding was repeated in another study, where an increasing occurrence of verbal aggression was observed in relation to high job demands (Magnavita & Heponiemi 2012). Also, greater emotional job demands have been associated with the increasing occurrence of different types of aggression (Park et al 2015). Furthermore, associations between low job control (Rodwell et al. 2013) and perceptions of low autonomy in working styles (Stutte et al. 2017) have been found to be related to increased experiences of aggression.

Previous investigations have also reported associations between low perceptions of justice in the workplace and increased experiences of aggression (Park et al. 2015, Magnavita et al. 2012). Park et al. (2015) found that nurses' low perceptions of justice, e.g. fair ways of resolving conflicts in the workplace, may increase the odds for both physical and verbal aggression. Similar results were obtained in another study, where an association between low perceptions of justice and an increasing occurrence of non-physical aggression in healthcare staff was detected (Magnavita & Heponiemi 2012).

The abovementioned studies are mainly cross-sectional by nature, and therefore conclusions about the causal relationships cannot be drawn. Only two studies utilizing a longitudinal design in this area were identified from the electronic databases (Magnavita 2013, Magnavita 2014). In a study conducted in Italian public healthcare facilities, workers experiencing higher job strain at baseline had a significant risk of being subjected to non-physical aggression in the ensuing year. Also, elevated job demands at baseline were associated with an increasing occurrence of both non-physical and physical aggression in the following year, while low job control was associated with increased non-physical aggression only (Magnavita 2013). These results were partly replicated in a study conducted in a hospital for infectious diseases; high job strain, high job demands and low control at baseline were again associated with non-physical aggression at the follow-up, whereas association between job demands and physical aggression was non-significant (Magnavita et al. 2014).

#### ***2.5.4 Summary of the exposing factors of aggression and gaps in current knowledge***

Table 4 summarizes the most relevant exposing factors of aggression related to this study in the context of the first three levels of the Socio-Ecological Model (Arnetz et al. 2015) based on previous literature. At the individual level, there are several demographic characteristics of healthcare staff that seems to expose them to experiences of aggression. However, the characteristics vary between individual studies and even non-significant associations are reported. This demonstrates the importance of determining whether these factors indeed expose staff to experiences of aggression. Regarding other individual level factors, such as negative affect and psychological distress, the evidence is only cross-sectional where conclusions about causal relationships cannot be drawn, although longitudinal evidence exists on similar concepts, such as anxiety and depression. This indicates, that longitudinal research is needed regarding negative affect and psychological distress as exposing factors of aggression, as well.

At the relationship level, previous studies have detected that different types of problems in relationships in the workplace, such as poor support in the workplace from co-workers or supervisors, conflicts between staff members and poor quality of teamwork, may expose staff to aggression. The evidence is mainly cross-sectional, although two longitudinal studies exist regarding overall support at the workplace. However, studies regarding similar concepts, such as workplace social capital, team climate and satisfaction with leadership, is missing, which demonstrates the importance of conducting studies related to these concepts.

At the work environment level, previous studies have observed the increasing occurrence of aggression related to job strain, low autonomy in working styles and poor organizational justice, for example. However, evidence is, again, mainly cross-sectional, apart from studies concerning job strain. Furthermore, research regarding similar concepts, such as participation in decision making and other factors relating to the non-physical work environment, for example, effort-reward imbalance and job insecurity, is missing altogether. This demonstrates the importance of conducting studies in this area.

To summarize, there are gaps in the current knowledge related to the exposing factors of patient aggression at these levels related to the designs used and concepts studied. The few longitudinal studies conducted have not determined whether the aggression is perpetrated by patients or by co-workers. Furthermore, research conducted specifically in the most vulnerable settings for aggression, i.e., psychiatric and emergency settings, is scarce.

**Table 4.** Exposing factors of aggression in the context of the Socio-Ecological Model (Arnetz et al. 2015) based on previous literature

Level	Exposing factor	Discrepancies and/or gaps in the current literature
<b>Individual</b>	Gender e.g. 1-3	<ul style="list-style-type: none"> <li>• Reports on the significantly increasing occurrence of aggression regarding both genders depending on the study,<sup>1,2</sup> may depend on the type of aggression,<sup>3</sup> also non-significant associations reported<sup>4</sup></li> </ul>
	Age e.g. 5-6	<ul style="list-style-type: none"> <li>• Younger nurses are more exposed to aggression,<sup>5</sup> reports also on increasing occurrence in older nurses,<sup>6</sup> also non-significant associations reported<sup>7</sup></li> </ul>
	Work experience (overall <sup>8</sup> or in one unit <sup>9</sup> )	<ul style="list-style-type: none"> <li>• Decreasing occurrence of aggression related to an increase in work experience,<sup>8,9</sup> also opposite results<sup>10</sup> and non-significant associations reported<sup>11</sup></li> </ul>
	Professional status <sup>7</sup> or level of education <sup>12</sup>	<ul style="list-style-type: none"> <li>• Lower professional status exposes to aggression,<sup>7,11</sup> reports also on higher level of education and increased exposure to aggression,<sup>12</sup> non-significant associations also reported<sup>13</sup></li> </ul>
	Working time (shift work) <sup>8</sup> and longer working hours <sup>14</sup>	<ul style="list-style-type: none"> <li>• No discrepancies identified</li> </ul>
	Negative affect <sup>15</sup>	<ul style="list-style-type: none"> <li>• No discrepancies identified</li> <li>• Evidence is only cross-sectional<sup>15</sup></li> </ul>
	Psychological distress <sup>16</sup>	<ul style="list-style-type: none"> <li>• No discrepancies identified</li> <li>• Evidence is only cross-sectional,<sup>16</sup> although longitudinal evidence exists from related concepts, such as anxiety and depression<sup>17</sup></li> </ul>
<b>Relationship</b>	Poor relationships in the workplace <sup>11,17-19</sup>	<ul style="list-style-type: none"> <li>• Poor relationships in terms of, e.g., low overall social support,<sup>16</sup> between staff or from supervisors,<sup>19</sup> and conflicts between staff members<sup>11</sup> in the workplace expose staff to aggression, but also reports on higher mutual trust between staff members and increased aggression exist<sup>10</sup></li> <li>• Mainly cross-sectional, but two longitudinal studies exist regarding social support at the workplace and aggression,<sup>17,18</sup> al-though evidence regarding social capital, team climate and satisfaction with leadership is missing</li> </ul>
	Poor and medium quality of teamwork <sup>20</sup>	<ul style="list-style-type: none"> <li>• No discrepancies identified</li> <li>• Evidence is only cross-sectional<sup>20</sup></li> </ul>
<b>Work environment</b>	Job strain (low job control; high job demands) <sup>17,18</sup>	<ul style="list-style-type: none"> <li>• No discrepancies identified</li> <li>• Two longitudinal studies identified in this area, but conducted in different settings than that of this study</li> </ul>
	Low autonomy in working styles <sup>5</sup>	<ul style="list-style-type: none"> <li>• No discrepancies</li> <li>• Evidence is only cross-sectional<sup>5</sup></li> </ul>
	Poor organizational justice <sup>10,16</sup>	<ul style="list-style-type: none"> <li>• No discrepancies identified<sup>10,16</sup></li> <li>• Evidence is only cross-sectional<sup>10,16</sup></li> </ul>

<sup>1</sup>Abed et al. 2016, <sup>2</sup>Sheal et al. 2017, <sup>3</sup>Edward et al. 2016, <sup>4</sup>Gillespie et al. 2017, <sup>5</sup>Stutte et al. 2017, <sup>6</sup>Chen et al. 2009, <sup>7</sup>Shea et al. 2017, <sup>8</sup>Cheung et al. 2017, <sup>9</sup>Chen et al. 2011, <sup>10</sup>Park et al. 2015, <sup>11</sup>Kelly et al. 2015, <sup>12</sup>Jiao et al. 2015, <sup>13</sup>Zampieron et al. 2009, <sup>14</sup>Esthryn-Behar et al. 2008, <sup>15</sup>Rodwell et al. 2013, <sup>16</sup>Magnavita & Heponiemi 2012, <sup>17</sup>Magnavita 2013, <sup>18</sup>Magnavita 2014, <sup>19</sup>Shields & Wilkins 2009, <sup>20</sup>Camerino et al. 2008

### **3 AIMS OF THE STUDY**

The overall aim of this study is to describe nurses' individual, relationship and work environment characteristics that can expose them to patient aggression in psychiatric and non-psychiatric specialties (emergency, and medical and surgical specialties). The Socio-Ecological Model for prevention of patient-to-worker aggression in hospitals (Arnez et al. 2015) was used as a theoretical framework. The sub-aims of the study are as follows:

- I) To describe the occurrence, characteristics and consequences of patient aggression experienced by nurses (Paper I),
- II) To describe individual factors that expose nurses to patient aggression (Papers II–IV),
- III) To describe relationship factors that expose nurses to patient aggression (Papers II–IV), and
- IV) To describe work environment factors that expose nurses to aggression (Papers II–IV).

## 4 MATERIALS AND METHODS

### 4.1 Theoretical and methodological approach

The theoretical approach of this study was based on the modification of the four-level Socio-Ecological Model (Dahlberg & Krug 2002, CDC 2009), presented by Arnetz et al. (2015), for the prevention of patient-to-worker aggression in hospitals. The socio-ecological approach was chosen because, in the development of efforts to prevent workplace aggression, the identification of exposing factors at different levels facilitates the establishment of specific interventions for those levels (CDC 2018). This specific modification of the Socio-Ecological Model was chosen because it considers the studied phenomenon broadly in different types of hospital settings (Arnetz et al. 2015) as opposed to modifications that consider the phenomenon in psychiatric settings only (Hamrin et al. 2009, Gillespie et al. 2015).

Before examining the exposing factors, the occurrence, characteristics and consequences of patient aggression among the three nursing specialties were explored in this study, as is recommended by the World Health Organization (Dahlberg & Krug 2002, see also Mercy et al. 1993). Exploration of the exposing factors of patient aggression concentrated on the first three levels of the Socio-Ecological Model (Arnetz et al. 2015), i.e. the individual, relationship and work environment levels. In this study, these three levels were operationalized from the perspective of nurses. More specifically, the factors related to these levels were operationalized as follows: 1) the individual level included nurse characteristics (demographics, negative affect and psychological distress), 2) the relationship level included nurses' perceptions of workplace social capital, team climate/collaboration and satisfaction with leadership, and 3) the work environment level included characteristics of the job (non-physical work environment), which were job strain, effort-reward imbalance, job insecurity, participation in decision making, and organizational justice.

Table 5 describes the operationalization of characteristics and consequences of patient aggression studied, and three levels of the Socio-Ecological Model (Arnetz et al. 2015) in the context of this study.

**Table 5.** Sub-aims, operationalization and papers of the study

Sub-aim	Operationalization	Paper
<b>I</b>	<p><b>Occurrence and characteristics of patient aggression</b></p> <ul style="list-style-type: none"> <li>Physical assaults, mental abuse, armed threats, assaults on ward property</li> </ul> <p><b>Consequences of patient aggression</b></p> <ul style="list-style-type: none"> <li>Self-rated health</li> <li>Psychological distress</li> <li>Sleep disturbances</li> <li>Work ability</li> </ul>	I
<b>II</b>	<p><b>Individual factors that expose nurses to patient aggression</b></p> <ul style="list-style-type: none"> <li>Demographics (sex, age, professional status, working time, form of working hours, work hours per day, number of years in the current position)</li> <li>Negative affect (trait anxiety)</li> <li>Psychological distress</li> </ul>	II–IV
<b>III</b>	<p><b>Relationship factors that expose nurses to patient aggression</b></p> <ul style="list-style-type: none"> <li>Workplace social capital</li> <li>Team climate/collaboration</li> <li>Satisfaction with leadership</li> </ul>	II–IV
<b>IV</b>	<p><b>Work environment factors that expose nurses to aggression</b></p> <ul style="list-style-type: none"> <li>Job strain</li> <li>Effort-reward imbalance</li> <li>Job insecurity</li> <li>Participation in decision making</li> <li>Organizational justice</li> </ul>	II–IV

For detailed definitions of each operationalization, see Appendix 2

The methodological approach of this study was observational (Mann 2003, Carlson & Morrison 2009, Caruana et al. 2015), where both cross-sectional and longitudinal approaches were combined. A cross-sectional approach was first used to estimate and compare the occurrence of patient aggression and the wellbeing consequences of patient aggression in the psychiatric and two non-psychiatric specialties (Sub-aim I). Second, cross-sectional approaches were used to identify the associations between nurses' individual, relationship and work environment characteristics and patient aggression in psychiatric specialties, to guide the exposure selection for a longitudinal study including all three nursing groups (Carlson & Morrison 2009, Caruana et al. 2015) (Sub-aims II–IV). Third, a longitudinal approach was used to investigate the causal relationships between the nurses' individual, relationship and work environment exposures and outcomes of interest, i.e. different types of patient aggression in all three nursing groups (Caruana et al. 2015) (Sub-aims II–IV).

## 4.2 Design

The overall design of the study was observational (Omair 2015). This study combined four different types of cross-sectional and longitudinal designs.

In **Paper I**, analytical cross-sectional survey research design (Omair 2015) was used to estimate and compare the occurrence of patient aggression and the associations between patient aggression and its consequences in psychiatric and non-psychiatric specialties (emergency, and medical and surgical specialties). An analytical cross-sectional survey research design was chosen because it allowed comparisons between psychiatric nurses and the two other nursing groups (Omair 2015) (Sub-aim I).

In **Paper II**, a cross-sectional, multilevel survey research design (Blakely & Woodward 2000) was used to explore the associations between certain individual, relationship and work environment characteristics of

psychiatric nurses, and patient aggression. The multilevel design was selected because it takes into account the similarity of the individuals within work units (Blakely & Woodward 2000) (Sub-aims II–IV).

In **Paper III**, a cross-sectional model testing design (Grove et al. 2013) was used to test a hypothesized model of relationships between certain individual, relationship and work environment characteristics of psychiatric nurses, and patient aggression. The cross-sectional model testing design was used due to its suitability for examining relationships between variables that have been defined only on a theoretical level (Grove et al. 2013) (Sub-aims II–IV).

In **Paper IV**, a prospective longitudinal cohort design (Caruana et al. 2015) was used to examine longitudinal associations between certain individual, relationship and work environment characteristics of nurses at baseline, and patient aggression at a follow-up, in the psychiatric and two non-psychiatric specialties. The prospective longitudinal cohort design was selected because it is suitable for describing causal relationships between nurses' individual, relationship and work environment exposures and different types of patient aggression (Sub-aims II–IV).

### 4.3 Setting

In **Paper I**, the setting of the study was 21 public hospitals in the area of five hospital districts in Finland consisting of units providing care in psychiatric, emergency, and medical and surgical specialties. Psychiatric specialties consisted of different types of psychiatric inpatient and outpatient units (84 units). Emergency specialties consisted of emergency and ambulatory units (17 units). Medical and surgical specialties consisted of, for example, units providing care in the following specialties: surgery, internal medicine, pediatrics, neurology, intensive care, oncology, pulmonary diseases, ophthalmology, otology, dermatology and venereology, psychiatry, obstetrics and gynecology (338 units) (Sub-aim I).

In **Paper II**, the setting of the study was 84 different types of psychiatric inpatient and outpatient units from the abovementioned participating hospitals (see Paper I). These units provided care for several different types of psychiatric patients, including children, adolescents, adults and the elderly (Sub-aims II–IV).

In **Paper III**, the setting of the study was 69 different types of psychiatric inpatient units from the participating hospitals. These units provided inpatient care for several different types of psychiatric patients, including children, adolescents, adults and the elderly (see Papers I and II) (Sub-aims II–IV).

In **Paper IV**, the setting of the study was psychiatric inpatient and outpatient units (78 units), emergency units (17 units) and medical and surgical units (293 units) from the abovementioned participating hospitals (see Paper I) (Sub-aims II–IV).

### 4.4 Sampling and sample

In this study, non-probabilistic sampling strategies were used (Omair 2014, Etikan & Bala 2017). These types of sampling strategies were chosen because they reveal understanding of an issue, here, patient aggression and its consequences and exposing factors, in great detail for one particular population (Setia 2016), here, the nursing staff in psychiatric and non-psychiatric specialties. All the samples were drawn from the Finnish Public

Sector Study cohort consisting of the nurses who answered the questionnaire in 2011–2012 and 2015 (FPS, see e.g. Kivimäki et al. 2010). Table 6 shows the details of the sampling and sample of the study by paper.

In **Paper I**, consecutive sampling (Polit & Beck 2012, Omair 2014) was used to reach all the available nurses from the FPS study cohort (from years 2011–2012). The inclusion criteria were as follows: professional status of practical/enrolled nurse, registered nurse or head nurse. The exclusion criteria were as follows: nurses working in pathology, laboratory or in administration. These nurses were excluded due to the lesser amount of patient contact. A total of 7523 nurses were invited to participate in the FPS study during the data collection year, and the sample consisted of 5228 nurses working in psychiatric and non-psychiatric specialties who answered the questionnaire, yielding a response rate of 70% (Sub-aim I).

In **Paper II**, a sub-sample sampling (Grove et al. 2013, Polit & Beck 2012) was used to select nurses working in psychiatric units from the sample including all available nurses selected for Paper I (see Paper I). The inclusion criteria were as follows: professional status of practical/enrolled nurse, registered nurse or head nurse, and working in any type of psychiatric unit. The exclusion criteria were as follows: working in any other type of unit than psychiatric unit (non-psychiatric specialties). The sample consisted of 923 nurses working in psychiatric units who met the inclusion criteria (Sub-aims II–IV).

In **Paper III**, a sub-sample sampling (Grove et al. 2013, Polit & Beck 2012) was used to select nurses working in psychiatric inpatient units from the sample including all available nurses selected for Paper I (see Papers I and II). The inclusion criteria were as follows: professional status of practical/enrolled nurse, registered nurse or head nurse, working in a psychiatric inpatient unit and had answered the questionnaire by May 2012. The exclusion criteria were as follows: working in any other type of unit than psychiatric inpatient unit (such as an outpatient psychiatric unit or non-psychiatric specialties). The sample consisted of 758 nurses who met the inclusion criteria (Sub-aims II–VI).

In **Paper IV**, consecutive sampling (Polit & Beck 2012, Omair et al. 2014) was used to reach all the available nurses who had participated in the study during both baseline data collection years 2011–2012 (Papers I–III) and the follow-up data collection (year 2015). The inclusion criteria were as follows: professional status of practical/enrolled nurse, registered nurse or head nurse, and had participated in data collection at both time points. The exclusion criteria were as follows: nurses working in pathology, laboratory or in administration. A total of 3899 of those nurses who participated in 2011–2012 were working for the target hospitals at the time of the follow up. The sample consisted of 2981 nurses working in psychiatric and non-psychiatric specialties, yielding a response rate of 76%. (Sub-aims II–IV).

**Table 6.** Details of the sampling and sample of the study

Paper	Data collection year of FPS study	Sampling method	Inclusion/exclusion criteria	Sample
<b>I</b>	2011–2012	Consecutive sampling (all available nurses from FPS study cohort)	<ul style="list-style-type: none"> <li>• Inclusion: practical/enrolled nurse, registered nurse or head nurse</li> <li>• Exclusion: nurses working in pathology, laboratory or in administration</li> </ul>	Nurses working in psychiatric and non-psychiatric settings (N= 5228)
<b>II</b>	2011–2012	Sub-sampling (from the participants of Paper I)	<ul style="list-style-type: none"> <li>• Inclusion: practical/enrolled nurse, registered nurse or head nurse, working in psychiatric unit</li> <li>• Exclusion: nurses working in pathology, laboratory or in administration, working in non-psychiatric unit</li> </ul>	Nurses working in psychiatric settings (N= 923)
<b>III</b>	2011–2012	Sub-sampling (from the participants of Paper I)	<ul style="list-style-type: none"> <li>• Inclusion: practical/enrolled nurse, registered nurse or head nurse, working in psychiatric inpatient unit, answered the questionnaire by May 2015</li> <li>• Exclusion: nurses working in pathology, laboratory or in administration, working in non-psychiatric or some other psychiatric unit than inpatient unit</li> </ul>	Nurses working in psychiatric inpatient settings (N= 758)
<b>IV</b>	2011–2012 (baseline) and 2015 (follow-up)	Consecutive sampling (all available nurses from FPS cohort who participated the study at both timepoints)	<ul style="list-style-type: none"> <li>• Inclusion: practical/enrolled nurse, registered nurse or head nurse, participated in the study at both timepoints</li> <li>• Exclusion: nurses working in pathology, laboratory or in administration</li> </ul>	Nurses working in psychiatric and non-psychiatric settings (N= 2981)

#### 4.5 Data collection instruments

For **Papers I–IV**, information regarding each nurse’s medical specialty, professional status and type of employment was extracted from employers’ registers, and the rest of the demographic information was collected from the survey. Table 7 shows the demographic information collected from survey with the question types and scaling.

**Table 7.** Papers of the study and demographic information collected from survey

Paper	Characteristic	Type of question	Scaling
I-IV	Sex	Nominal	1=female 2=male
I-IV	Age	Open	N/A
I-IV	Type of working time	Nominal	1=fulltime 2=part-time
I-III	Form of working hours	Nominal	1=regular dayshift 2=two shifts 3=three shifts 5=night shift only 4=other irregular work
II	Work hours per day	Open	N/A
I-IV	Number of years in current position	Open	N/A
I,III	Number of years at current hospital	Open	N/A

Altogether 14 different self-rated instruments were used to measure the consequences of patient aggression on nurses' wellbeing (Sub-aim I), individual, relationship and work environment factors that can expose nurses to aggression (Sub-aims II-IV), and patient aggression (Sub-aims I-IV). Table 8 shows the specific instruments used in this study by papers of the study. The number of items per instrument ranged between 1 and 14. All of the instruments have previously been used in the Finnish population (see Table 8 for references). The internal consistency of the instruments in this study ranged from respectable to excellent ( $\alpha = 0.76-0.94$ , see Papers III-IV), with the exception of the effort-reward imbalance measure's reward subscale's acceptable internal consistency ( $\alpha = 0.65$ , see Paper IV). For information on how each of the instruments was used in analysis, see Papers I-IV. For a description of what each instrument in this study measured, see Appendix 2.

**Table 8.** Papers of the study, instruments (subscales, items and scaling) and sub-aims of the study

Paper	Instrument	Subscales, items	Scale	Sub-aim	
<b>I</b>	Self-rated health <sup>1</sup>	1 item	5-point (1 = good to 5 = poor)	I	
	Sleep disturbances (Jenkins Sleep Scale) <sup>2</sup>	4 items	5-point ordinal	I	
	Psychological distress (GHQ-12) <sup>3</sup>	12 items	four-point (0 = not at all to 3 = much more than usual)	I	
	Work ability Index (WAI) <sup>4</sup>	1 item	10-point (0 = completely unable to work to 10 = work ability at its best)	I	
	<b>II</b>	Negative affect (STAI; trait scale) <sup>5</sup>	6 items	5-point (1 = not at all to 4 very much so)	II
Workplace social capital <sup>6</sup>		8 items	5-point (1 = not at all to 5 = very much so)	III	
Satisfaction to leadership <sup>7</sup>		3 items	7-point (1 very unsatisfied to 7 very satisfied)	III	
Effort-reward imbalance <sup>8</sup>		Effort, 1 item; Reward, 3 items	5-point (1 = very little to 5 = very much)	IV	
Job strain (JCO) <sup>9</sup>		Job demands, 3 items; Job control, 9 items	5-point (1 = disagree to 5 = agree)	IV	
Job insecurity <sup>10</sup>		4 items	5-point (1 very little to 5 very much)	IV	
Participation in decision making <sup>10</sup>		1 item	3-point ordinal	IV	
<b>III</b>		Psychological distress (GHQ-12) <sup>3</sup>	See Paper I	See Paper I	II
		Collaboration (TCI-14) <sup>11</sup>	Participative safety, 4 items; Support for innovation, 3 items	5-point (1 =totally disagree to 5 = totally agree)	III
		Organizational justice <sup>12</sup>	Procedural justice, 7 items; Relational justice, 6 items	5-point scale (1= totally disagree to 5 = totally agree)	IV
	<b>IV</b>	Negative affect (STAI; trait scale) <sup>5</sup>	See Paper II	See Paper II	II
		Team climate (TCI-14) <sup>11</sup>	Participative safety, 4 items; Support for innovation, 3 items; Vision, 4 items; Task orientation, 3 items	5-point (1 = totally disagree to 5 = totally agree)	III
		Job strain (JCO) <sup>9</sup>	See Paper II	See Paper II	IV
		Effort-reward imbalance <sup>8</sup>	See Paper II	See Paper II	IV
	<b>I-IV</b>	Organizational justice <sup>12</sup>	See Paper III	See Paper III	IV
		Patient aggression <sup>13</sup>	Assaults on ward property, 1 item; Mental abuse, 1 item; Physical assaults, 1 item; Armed threats, 1 item*	dichotomous (1 = yes, 2 = no); month of exposure (1 = January to 12 = December)	I-IV

<sup>1</sup>Kivimäki et al. 2003, <sup>2</sup>Jenkins et al. 1988, <sup>3</sup>Goldberg et al. 1997, <sup>5</sup>Spielberger et al. 1983, <sup>6</sup>Kouvonen et al. 2006, <sup>7</sup>Hackman et al. 1975, Virtanen et al. 2009, <sup>8</sup>Siegrist 1996, Kivimäki et al. 2007, <sup>9</sup>Karasek & Theorell 1990, Laine et al. 2009, <sup>10</sup>Kivimäki et al. 2000, <sup>11</sup>Anderson & West 1998, Kivimäki et al. 1999, <sup>12</sup>Moorman 1991, Elovainio et al. 2002, <sup>13</sup>Virtanen et al. 2011. \* In 2012, the question was formulated as 'Have you experienced any of the following aggressive incidents at your workplace in the last 12 months', and year 2015 'Have you experienced any of the following aggressive incidents at your workplace from patients in the last 12 months'.

#### **4.6 Data collection**

In **Papers I–IV**, the data collection was a part of the Finnish Institute of Occupational Health's (FIOH) Finnish Public Sector Study (FPS, see e.g. Kivimäki et al. 2010). With the FPS study, beginning in 2000 employers' records have been used to identify staff members eligible for survey cohorts. These staff members have been sent questionnaires every four years.

For **Papers I–III**, the data collection of the FPS study was conducted between November 2011 and May 2012. Data collection was conducted by using employers' records and self-report surveys. Self-report surveys are usable for obtaining larger and geographically diverse samples, and interviewer bias can be avoided (Polit & Beck 2012). First, the eligible employees and their information were identified from the employers' records with their email addresses, by a contact person from each organization, who further delivered the information to FIOH. Second, emailed questionnaires were sent to employees identified from the employers' registers, and 3 reminder emails were sent within one week from each other. Reminders were used to increase the response rate (McPeake 2014). Third, those who did not answer the emailed questionnaires, were sent a paper version of the questionnaire to their workplace, to further ensure a good response rate (Kroth et al. 2009). For **Paper IV**, in addition to the data collection described above (2011–2012), the follow-up information regarding patient aggression was collected in 2015 between September and November, using both the emailed and mailed questionnaires following the same procedure as described above (Papers I–III).

#### **4.7 Data analyses**

In **Paper I**, the occurrence and characteristics of patient aggression were analyzed with descriptive statistics, and the occurrences of different types of aggression in the psychiatric and two non-psychiatric nursing groups were compared with Fisher's exact test. The differences in the consequences of patient aggression between the psychiatric and the two non-psychiatric specialties were analyzed with binary logistic regression models with interaction terms (Norton et al. 2004). An interaction term was included between the nursing specialties (psychiatric and emergency specialties, or psychiatric and medical and surgical specialties) and reports on aggression (yes), to compare the consequences of patient aggression between the specialty groups. The psychiatric nurses who reported exposure to patient aggression were compared to one of the two non-psychiatric nursing groups who reported exposure to patient aggression. Analyses were done with SPSS version 22.0 (SPSS IBM, New York, NY, USA) (Sub-aim I).

In **Paper II**, associations between nurses' age, sex, professional status, working times, form of working hours, number of years in the current position, and negative affect, and different types of patient aggression were analyzed with logistic regression analysis (Sperandei 2014) at the individual level. Second, associations between job strain, effort-reward imbalance, job insecurity, social capital, satisfaction with leadership and work hours, and the occurrence of patient aggression were analyzed with generalized linear mixed modeling, because it takes into account the non-independence of observations within work units (GLMM; Casals et al. 2014). For all analyses, SPSS version 24 was used (Sub-aims II–IV).

In **Paper III**, the hypothesized relationships between organizational justice, collaboration among nurses, psychological distress, and patient aggression were analyzed with structural equation modeling (SEM; Byrne

2012). This method was chosen because it is suitable for confirmatory testing of model hypotheses that are supported by either empirical research or theories (Byrne 2012). Criteria for goodness of fit of the model included non-significant chi-square statistics, the Tucker-Lewis Index (Hu & Bentler 1999), the comparative fit index (Bentler 1990), the root-mean-square error of approximation, and the standardized root-mean-square residual (Hu & Bentler 1999). The model's ability to explain patient aggression was assessed by using the coefficient of determination ( $R^2$ ) (Lewis-Beck 2004). Mplus was used for the SEM analysis (Sub-aims II–IV).

In **Paper IV**, first, the relationship between the age, sex, professional status, number of years in the current position and negative affect of nurses, and different types of patient aggression were analyzed with binary logistic regression analysis in the three nursing specialty groups. Second, the longitudinal associations between baseline job strain, effort-reward imbalance, organizational justice, satisfaction with leadership and team climate, and the occurrence patient aggression at the follow-up was analyzed with binary logistic regression (Sperandei 2014). This analysis was conducted in two steps; first, only individual and employment characteristics (age, sex, professional status and number of years in the current position, negative affect) were controlled for. Second, the models were corrected for experiences of baseline aggression. For all analyses, the SPSS 24 program package was used (Sub-aims II–IV).

#### **4.8 Summary of the methods used**

In this study, both cross-sectional and longitudinal survey designs were used. The settings of the study included different types of psychiatric, emergency or medical and surgical units. Different types of non-probabilistic sampling strategies were used, and sample sizes ranged between 758 and 5,228 nurses. Employers' records, and structured self-report emailed and mailed questionnaires were used to collect the data in 2011–2012 and 2015. Different types of statistical methods were used to analyze the data, e.g., descriptive statistics, logistic regression and advanced modeling techniques. A summary of the methodological approaches of this observational study are presented in Table 9 by papers of the study.

Table 9. Summary of the methods used in the observational study

Paper	Design	Setting	Sampling <sup>a</sup> , participants	Data collection method, year	Data analysis	Sub-aim
I	Analytical cross-sectional survey	Psychiatric, emergency, medical and surgical units	Consecutive sampling <sup>a</sup> , All specialties (N=5,228)	Employers records, Self-report survey, 2011–2012	Fisher's exact test, Binary logistic regression with interaction terms	I
II	Cross-sectional multilevel survey	Psychiatric outpatient and inpatient units	Sub-sampling <sup>a</sup> , Psychiatry (N= 923)	Employers records, Self-report survey, 2011–2012	Logistic regression, Generalized linear mixed modeling (GLMM)	II–IV
III	Cross-sectional model testing	Psychiatric inpatient units	Sub-sampling <sup>a</sup> , Psychiatry (N=758)	Employers records, Self-report survey, 2011–2012	Structural equation modeling (SEM)	II–IV
IV	Prospective longitudinal cohort	Psychiatric, emergency, medical and surgical units	Consecutive sampling <sup>b</sup> , All specialties (N=2,981)	Employers records, Self-report survey, 2011–2012, 2015	Binary logistic regression	II–IV

<sup>a</sup>Sample drawn from FPS Study cohort, 2011–2012

<sup>b</sup>Sample drawn from FPS study cohort, 2011–2012, those who also answered in 2015

## 4.9 Ethical considerations

For **Papers I–IV**, The Ethics Committee of the Hospital District of Helsinki and Uusimaa assessed the FPS study (/13/03/00/2011) by FIOH. The hospital organizations approved the FPS study. Throughout the study, the researchers followed good scientific practice, a requirement for its reliability, plausibility and ethical acceptability (ETENE 2006).

Three basic ethical principles, as defined in the Belmont Report (1979), were taken into account when this study was conducted, from the perspective of secondary data analysis (Brakewood & Poldrack 2013): 1) Respect for persons (subjects enter into the study with adequate information and voluntarily), 2) Beneficence (obligation to minimize possible harms and maximize the possible benefits of participation), and 3) Justice (equality in the selection of study participants and in the distribution of the burdens and benefits of the study) (Belmont Report 1979).

Regarding respect for persons (Belmont Report 1979), separate informed consent to participate in this particular doctoral thesis was not asked, the nurses had no possibility to decline their participation, nor did they have information about the specific goals of this doctoral dissertation, which might raise a question regarding the ethics of this study (Polit & Beck 2012). However, depending on the situation, getting a separate informed consent is not always necessary (Emanuel et al. 2000). The participants in this study gave their general consent for research purposes when they answered the questionnaire (Finnish Advisory Board for on Research Integrity 2018). Thus, the completed and returned questionnaires were considered as the nurses' informed consent to participate in the FPS study as well as in this doctoral thesis (Medical Research Act 9.4.1999/488). Furthermore, permission was given by FIOH to use the collected data in this doctoral thesis.

Regarding beneficence (Belmont Report 1979), in the case of secondary data analysis, such as was used in this study, the principle of beneficence is applied primarily with data security measures (Brakewood & Poldrack 2013). Protection of participants' privacy and anonymity was mainly the responsibility of the original data holder, FIOH (Windle 2010, Brakewood & Poldrack 2013). Data for this study was released in a manner that prevented the identification of the participants (Personal Data Act 523/1999). The datasets were stripped of identifiers (such as specific work units and working areas), and individual participants were given a code (NIH 2004) to protect participants' anonymity before releasing the data to be used in this study. Original questionnaires and datasets are stored in FIOHs' research registry in locked facilities with backup-files and metadata; data managed in this study is was in coded form, and was stored on USB-drives in locked facilities (Archives Act 831/1994). Therefore, the researcher has not handled data that could have revealed the identity of the individual participants, and thus, the identification of the participants from the report is not possible (The Finnish Advisory Board on Research Integrity 2009). Moreover, moving ahead from data security, it is beneficial to use secondary data, because it might be considered as unethical to strain new participants with the study when the data needed to reach the aims of the study in question is already available (Brakewood & Poldrack 2013). This is the case especially because of the sensitive and personal questions needed to be asked to reach the study aims, which could cause the participants to experience negative feelings. This relates in particular to the questions regarding patient aggression, because the situations may have been traumatic and returning to them can cause anxiety and distress. Furthermore, denying the use of pre-existing data might

reduce the ability to spread the benefit of knowledge related to the study topic, by decreasing access to a larger population for whom the knowledge gained from this study might be generalized (Brakewood & Poldrack 2013).

Regarding justice (Belmont Report 1979), the selection of participants was equal in this study; all available nurses fulfilling inclusion criteria, irrespective of their professional status, were selected from the FPS study cohort. Regarding even distribution of burdens of the study, there was no extra burden put on participants when acquiring this secondary data. Similarly, there were no extra benefits for those who were included in this current study. On the other hand, those who were not included in the study will receive the same benefits than those who did not if the results are used in the development of their working conditions and prevention of patient aggression.

Finally, the scientific reliability and validity of results (from the principles of justice and beneficence described in Belmont Report 1979; see also ALLEA 2017) were considered. In this study, a statistician was either consulted or one participated in the data analysis (Hutton 2014) to ensure the appropriateness of the analysis methods used and the interpretation of the results; thus, the results conform to scientific criteria and are ethically sustainable (Finnish Advisory Board for on Research Integrity 2012). The results are communicated in a manner that is open and responsible (Finnish Advisory Board for on Research Integrity 2012).

## **5 RESULTS**

### **5.1 Study participants**

Altogether 5,228 nurses participated in the study regarding sub-aim I (923 psychiatric nurses, 295 emergency nurses, 4,070 medical and surgical nurses). Regarding sub-aims II–IV, the cross-sectional studies of the exposing factors were conducted with subsamples of 923 psychiatric nurses working in inpatient and outpatient units, and 758 nurses working in psychiatric inpatient units, derived from participants of the study regarding sub-aim I. Altogether 2,981 nurses participated in the longitudinal study (538 psychiatric nurses, 174 emergency nurses and 2,269 medical and surgical nurses) regarding the exposing factors (Sub-aims II–IV). The characteristics of study participants by sub-aims of the study are described in Table 10.

**Table 10.** Characteristics of the study participants

Demographic characteristics	Sub-aim I						Sub-aims II-IV							
	Psychiatric nurses <sup>1</sup> (N = 923)		Emergency nurses <sup>2</sup> (N = 295)		Medical- and surgical nurses <sup>2</sup> (N = 4,070)		Psychiatric nurses <sup>3</sup> (N=758)		Psychiatric nurses <sup>4</sup> (N=538)		Emergency nurses <sup>4</sup> (N=174)		Medical- and surgical nurses <sup>4</sup> (N=2,269)	
	n/mean	%/SD	n/mean	%/SD	n/mean	%/SD	n/mean	%/SD	n/mean	%/SD	n/mean	%/SD	n/mean	%/SD
<b>Age</b>	43.98	10.86	39.78	8.84	43.21	11.18	43.96	10.95	45	9.6	42	10.5	44	9.9
<b>Sex</b>	923		295		4070		758		538		174		2269	
Female		75		86		95		74		75		87		95
Male		25		14		5		26		25		13		5
<b>Professional status</b>	923		295		4070		758		538		174		174	
Practical nurses		31		5		14		32		28		88		77
Registered nurse		59		87		76		58		59		5		12
Head nurses		10		8		10		10		13		7		11
<b>Type of employment</b>	923		295		4070		758							
Temporary		22		24		79		22						
Permanent		78		76		21		78						
<b>Number of years in the current position</b>	13.65	13.65	10.59	13.65	10.47	13.68	8.01	8.4	8.4	8.4	8.3	8.5	8.2	8.3
<b>Number of years at current hospital</b>	8.28	8.28	8.74	8.28	7.36	9.27	9.14							
<b>Form of working hours</b>	922		295		4045		757							
Regular dayshift		32		6		27		30						
Two shift		15		9		15		16						
Three shift		48		79		51		49						
Night shift only		4		2		3		4						
Other irregular work		1		4		4		1						
<b>Type of working time</b>	923		294		4033		758							
Part-time		5		6		10		5						
Full-time		95		94		90		95						

<sup>1</sup> Participants of Paper I and II; <sup>2</sup> Participants of Paper I; <sup>3</sup> Participants of Paper III; <sup>4</sup> Participants of Paper IV (those who participated in the follow-up data collection in 2015)

## 5.2 Occurrence, characteristics and consequences of patient aggression (Paper I)

Regarding the occurrence and characteristics of patient aggression, 41% of the nurses (N= 5,228) had experienced patient aggression in the previous 12 months. Approximately one-third (37%) reported experiences of mental abuse, 25% reported physical assaults, followed by 21% who reported assaults on ward property. Only 2% reported armed threats. When the experiences of patient aggression between psychiatric nurses and emergency nurses were compared, the analysis showed that, overall, emergency nurses were exposed to aggression more often (81% vs. 65%,  $p < 0.001$ ). Physical assaults and mental abuse occurred more often among emergency nurses than among psychiatric nurses (47% vs. 38%,  $p=0.005$ ; 75% vs. 61%,  $p < 0.001$ , respectively). However, the occurrence of all types of patient aggression was higher among psychiatric nurses compared to medical and surgical nurses (all  $p < 0.001$ ) (Paper I).

According to the analysis, the consequences of patient aggression on wellbeing may be more severe among non-psychiatric nurses, compared to psychiatric nurses. A comparison of the wellbeing-related consequences of patient aggression between psychiatric nurses and emergency nurses showed that psychiatric nurses who reported physical assaults and/or armed threats in the previous 12 months were less likely to report sleep disturbances (OR 0.57, test of interaction  $p = 0.044$ ). Comparisons between psychiatric nurses and medical and surgical nurses showed that psychiatric nurses who had experienced at least one type of patient aggression in the previous 12 months were less likely to experience sleep disturbances (OR 0.65, test of interaction  $p = 0.007$ ) and psychological distress (OR 0.55, test of interaction  $p = 0.003$ ) than medical and surgical nurses. Similar results were detected regarding comparisons between psychiatric nurses who experienced mental abuse and medical and surgical nurses who experienced mental abuse: psychiatric nurses were less likely to experience psychological distress (OR 0.39, test of interaction  $p < 0.001$ ) (Paper I).

## 5.3 Individual factors that expose nurses to patient aggression (Papers II–IV)

Individual factors that expose nurses to patient aggression in psychiatric settings were found. Nurses' characteristics including sex, age, number of years in a current position, professional status and form of regular working hours were related to patient aggression. Male nurses had higher odds for overall exposure to aggression (OR 1.90,  $p = 0.004$ ), mental abuse (OR 2.00,  $p = 0.001$ ), assaults on ward property (1.56,  $p = 0.02$ ), and physical assaults (OR 1.93,  $p < 0.001$ ) compared to female nurses. Younger nurses were more likely to experience all the different types of patient aggression (ORs 0.95-0.98,  $p$ -values  $p < 0.001 - p = 0.02$ ), as were those who were working in shifts or regular night shift (all  $p < 0.001$ ) (Paper II). Number of years in current position was associated with overall exposure to aggression (OR 1.03,  $p = 0.036$ ). Having a professional status of practical or registered nurse increased the odds for patient aggression compared to head nurses (all  $p < 0.001$ ) (Paper IV). Negative affect was not associated with aggression (Paper II, IV), nor was psychological distress (Paper III).

In emergency specialties, no significant associations between nurses' individual characteristics and different types of patient aggression were found. In medical and surgical specialties, male nurses had higher odds for experiencing assaults on ward property and physical assaults (OR 1.96,  $p = 0.005$ , OR 1.76,  $p=0.009$ , respectively). As in psychiatric settings, younger nurses were more likely to be exposed to different types of

aggression (ORs 0.95-0.96, all  $p < 0.001$ ), as were practical and registered nurses (all  $p < 0.001$ ). Negative affect was not associated with patient aggression in either of the non-psychiatric settings (Paper IV).

Table 11 shows the individual factors related to patient aggression (statistically significant) in the three nursing groups. The direction of the association is presented as up (↑) or down (↓) arrows.

**Table 11.** Individual factors related to aggression in the three nursing groups.

Individual factor	Psychiatric nurses	Emergency nurses	Medical and surgical nurses
Male gender	↑	-	↑
Younger age	↑	-	↑
Head nurse	↓	-	↓
Practical or registered nurse <sup>a</sup>	↑	-	↑
Longer time in current position	↑	-	-
Day shift <sup>b</sup>	↓	-	-
Other shift work or regular night shift <sup>b</sup>	↑	-	-

↑ = Higher odds for patient aggression, ↓ = Lower odds for patient aggression  
 - = non-significant or, <sup>a</sup> not analyzed in emergency settings, <sup>b</sup> not analyzed in emergency, and medical and surgical settings

#### 5.4 Relationship factors that expose nurses to patient aggression (Papers II–IV)

Relationship factors were not good predictors of exposure to patient aggression in psychiatric specialties, although the cross-sectional analysis first suggested that poor collaboration among nurses might expose them to patient aggression (significant at the 0.05 level) (Paper III). Also, poor and average satisfaction with leadership were associated with higher odds for overall exposure to patient aggression (OR 1.83,  $p=0.04$ , OR 1.93,  $p=0.02$ , respectively) in the cross-sectional analysis (Paper II). However, these became non-significant in the longitudinal analysis (Paper IV).

In emergency specialties, none of the relationship factors were significant in the longitudinal analysis. In medical and surgical specialties, the longitudinal analysis showed a significant association between team climate and mental abuse (OR 0.80,  $p = 0.036$ ) (Paper IV). This suggests that poor team climate is associated with an increased occurrence of mental abuse in medical and surgical specialties, while this was not found to be the case in the other two nursing groups. No other significant associations between other relationship factors and patient aggression were found.

#### 5.5 Work environment factors that expose nurses to patient aggression (Papers II–IV)

Work environment factors were not good predictors of exposure to patient aggression in psychiatric specialties, although the cross-sectional analysis first suggested that job strain is associated with higher odds for assaults on ward property (OR 1.65,  $p=0.02$ ) and that a separate component of job strain, job demands, was associated with higher odds for assaults on ward property (OR 1.99,  $p=0.001$ ) and mental abuse (OR 1.75,  $p=0.006$ ).

Similarly, high effort-reward balance was found to be associated with higher odds for assaults on ward property (OR 2.04,  $p=0.02$ ) in shift-working nurses (Paper II). A cross-sectional analysis also suggested that low organizational justice is associated with more frequent experiences of patient aggression (significant at the .05 level) (Paper III). However, in the longitudinal analysis, although job strain was first associated with higher odds for overall exposure to aggression, mental abuse and physical assaults (OR 1.27,  $p=0.05$ , OR 1.26,  $p=0.03$ , OR 1.28,  $p=0.05$ , respectively), it became non-significant after correction for baseline aggression. Similarly, effort-reward imbalance and organizational justice were non-significant in the longitudinal study (Paper IV). This suggests that work environment factors are not good predictors of exposure to patient aggression in psychiatric settings.

In emergency specialties, some work environment factors were associated with a higher occurrence of patient aggression in the longitudinal study after all adjustments. Higher effort reward imbalance was associated with higher odds for assaults on ward property (OR 3.24,  $p=0.01$ ). Organizational justice was found to reduce the odds ratios for the same type of aggression (OR 0.61,  $p=0.05$ ) (Paper IV). This suggests that high effort-reward imbalance and poor organizational justice are associated with an increased occurrence of assaults on ward property by patients in emergency specialties.

In medical and surgical specialties, some work environment factors were also associated with a higher occurrence of patient aggression in the longitudinal study after all adjustments. Higher job strain was associated with higher odds for mental abuse (OR 1.22,  $p=0.002$ ) (Paper IV). This suggests that high job strain is associated with an increased occurrence of mental abuse by patients in medical and surgical specialties.

Table 12 shows the work environment factors related to a higher occurrence of patient aggression (statistically significant) in the three nursing groups after the longitudinal study. The direction of the associations is presented as up (↑) or down (↓) arrows.

**Table 12.** Work environment factors related to a higher occurrence of aggression in the three nursing groups after the longitudinal study.

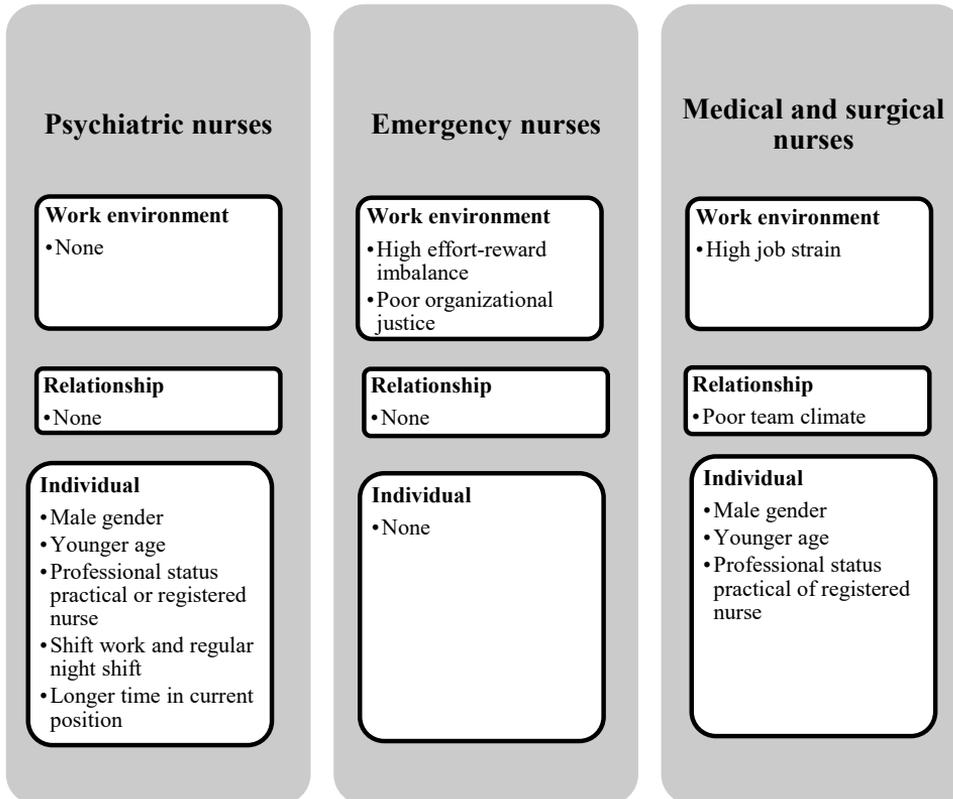
Work environment factor	Psychiatric nurses	Emergency nurses	Medical and surgical nurses
High job strain	-	-	↑
High effort-reward imbalance	-	↑	-
Poor team climate	-	-	↑
Poor organizational justice	-	↑	

↑ = Higher odds for patient aggression, ↓ = Lower odds for patient aggression  
 - = non-significant

## 5.6 Summary of the main results

The results revealed that aggression is experienced overall by over 40% of nurses. The most commonly experienced type of aggression was found to be mental abuse, and the rarest type was found to be armed threats. The consequences of aggression in terms of sleep problems and psychological distress may be more severe in

non-psychiatric nursing groups compared to psychiatric nursing groups. Figure 1 summarizes the nurses' individual characteristics and relationship and work environment factors that expose nurses to aggression in the three nursing groups.



**Figure 1.** Nurses' individual characteristics and relationship and work environment factors related to a higher occurrence of patient aggression in the three nursing groups

## 6 DISCUSSION

### 6.1 Validity and reliability of the study

The validity and reliability of this study is assessed by means of internal validity, construct validity, reliability and external validity of the findings. The assessment is mainly based on Carlson's and Morrison's (2009) description of relevant issues to consider when assessing the quality of observational research. The assessment primarily focuses on the internal validity of the study because low internal validity is a common problem in observational research (Carlson & Morrison 2009).

#### **Occurrence, characteristics and consequences of patient aggression (Sub-aim I)**

Regarding internal validity, the appropriateness of the research question in relation to the design of the study should be considered (Carlson & Morrison 2009). In this study, the occurrence and characteristics of experiencing patient aggression were evaluated in different nursing groups, which is a suitable research aim for a cross-sectional design because it is an appropriate approach for determining the prevalence of a phenomenon at a particular point in time (Carlson & Morrison 2009). However, the consequences of patient aggression were also studied; the use of a cross-sectional design poses a problem for the internal validity of our findings (Carlson & Morrison 2009). The exposure (patient aggression) and outcome (different types of consequences on wellbeing) were evaluated simultaneously, which resulted in the fact that, although we have evidence of the associations between these variables (or rather the difference in the associations between these variables in different nursing specialties), conclusions of the temporal relationship cannot be drawn (Carlson & Morrison 2009). This creates the possibility that the causal relationship between these variables might be opposite to those proposed in our study, or even non-existent (Carlson & Morrison 2009). However, in the questionnaire, patient aggression (exposure) was assessed retrospectively using nurses' experiences during the previous 12 months, while the consequences on wellbeing (outcomes) were assessed based on nurses' current experiences, which supports the appropriateness of our evaluation.

The internal validity of this study is also threatened by the fact that this type of design evaluates prevalent, rather than incidental, outcomes and thus excludes people who develop the outcome (in this case, a consequence on wellbeing) but leave study early (Carlson & Morrison 2009). Experiencing patient aggression has been shown to have a negative effect on nurses' health (see e.g. Itzhaki et al. 2015, Staggs 2015, Hamdan & Hamra 2017) and increase intentions of leaving the nursing profession (Esthryn-Behar et al. 2008). This could mean that those who are most affected by patient aggression in their workplace may have left their workplace or even the profession before this study was conducted. If this is the case, there is a bias that favors including only those in the study who are less affected by patient aggression and thus questions the internal validity of the findings. However, we could detect significant differences in the occurrence of the consequences on wellbeing (outcomes) in the nursing specialties, which suggests that even if the most severe cases left before the study, the difference could still be detected.

The internal validity of observational research also considers if alternative explanations have been appropriately ruled out (Carlson & Morrison 2009). In this study, there are several other explanations for our results that we did not control for. To name a few, some nurses may have had personality traits (such as trait

anxiety; see e.g. Kouvonen et al. 2006) that causes them to answer more negatively to questionnaires than others. This might have result in inaccurate estimations of the occurrence of patient aggression, or the existence of consequences on wellbeing in this study. Furthermore, we did not control for the fact that the nurses are nested within social environments of work units, which might have affected their overall perception of the factors studied, and therefore the estimations might be inaccurate in real life and might have been caused by other factors existing in the workplace. We did not have information on the stressors in study participants' personal lives, such as relationship breakdowns or house moves, which can also cause consequences on wellbeing (Cleland et al. 2016). However, there is evidence that patient aggression is the cause of poor wellbeing outcomes in healthcare staff (Yang et al. 2018, Viotti et al. 2015, Hamdan & Hamra 2017, Sun et al. 2017), which supports the explanation of the wellbeing outcomes in this study, and thus, also the difference detected in the outcomes.

The construct validity of this study, i.e., the success of the operationalization of the study's constructs (Polit & Beck 2012), is weakened by the use of self-reported instruments. With such instruments, there is always the possibility of distorted answers due to respondents misunderstanding a question or modifying an answer in order to give a socially desirable response. There is likewise a possibility of common method variance, where true correlations between variables are altered due to answers influenced (knowingly or unknowingly) by other questions or answers in the questionnaire (Fowler 2009). However, the measurements we used are widely used in epidemiological studies (see e.g. Kivimäki et al. 2003, Ahlström et al. 2010, Martus et al. 2010). Regarding individual measures, the self-rated health instrument has been shown to be sensitive to changes in health status (Kivimäki et al. 2003). Work ability assessment has been found to be comparable to the long version of the Work Ability Index (Ahlström et al. 2010, Martus et al. 2010), and the psychological distress measure has demonstrated excellent specificity (85.4) and sensitivity (81.7) (Lundin et al. 2017). Furthermore, by using self-rated questionnaires, it was possible to avoid interviewer bias, while at the same time enabling the obtainment of the larger sample needed to reach the study aims (Polit & Beck 2012). It is also necessary to consider the possible unsuccessful operationalization of patient aggression in this study regarding sub-aim I. In the questionnaire, it was not specified whether the perpetrator of the aggression was a member of the staff or a patient. However, based on previous literature, the main perpetrators of aggression are patients (Spector et al. 2014). Because reports of staff-to-staff aggression were rare in 2015 (see Paper IV), we may assume that the situation was similar in 2012, and thus it can be presumed that the measure is usable by proxy. Further, the validity of the measure is supported by findings of increasing risk of physical aggression related to patient overcrowding in earlier studies (Virtanen et al. 2011), a risk factors for patient aggression found early on in other studies (Davis 1991).

The reliability of the study is weakened by the lack of internal consistency statistics (such as a Cronbach's alpha for continuing variables, Pittman & Bakas 2010; Kuder-Richardson Formula 20 [KR20] for categorical variables, Vogt 2005) for the measures used regarding this study sample. It is possible that, because we used self-reported questionnaires, the participants might have understood the questions differently, which poses a threat to the reliability of our measurements. Unfortunately, this can only be speculated on because the internal consistencies were not calculated. However, the internal consistencies obtained for the instruments previously in the Finnish population are available from other studies regarding the sleep disturbance measure ( $\alpha = 0.84$ , Heponiemi et al. 2010) and psychological distress measure ( $\alpha = 0.90$ , Virtanen et al. 2003). This demonstrates

the good to excellent internal consistency of the measures, and therefore supports the reliability of the measurements (Pittman & Bakas 2010).

The external validity of the study, that is, the ability to generalize study results to a more universal population, is supported by the large geographical area covered, and sample size obtained, in this study (Carlson & Morrison 2009). The study was conducted in the areas of 21 hospitals in Finland and the sample size obtained from these hospitals was quite large (5,228 nurses). The results of this study can therefore be at the very least generalized to Finnish hospitals. The generalizability of the study to other countries is uncertain because healthcare systems and the organization of care varies between different countries. The Finnish specialized medical care system is described in detail in this study to support the reader's decision about the generalizability of the findings.

### **Exposing factors of patient aggression (Sub-aims II–IV)**

The internal validity of the study is supported by the appropriateness of the design in relation to the study question (Carlson & Morrison 2009). We first evaluated the associations between nurses' individual, relationship and work environment characteristics that could expose the nurses to patient aggression by using different types of cross-sectional designs in the psychiatric nursing group, to guide exposure selection for the final longitudinal cohort study. This is an appropriate approach because, before conducting a longitudinal study, there should be good evidence to suggest associations between exposure and outcome, from cross-sectional studies, for example (Carlson & Morrison 2009). However, it is possible that by using only the psychiatric nursing group to guide the selection of exposures for the longitudinal study including all nursing groups, we excluded some exposing factors that might have been associated with patient aggression in the non-psychiatric nursing groups. This might be the case especially because, as the results of the longitudinal study show, nurses' individual, relationship and work environment characteristics associated with patient aggression differ between the three nursing groups. It is possible that, e.g., social capital, a relationship factor, and psychological distress, an individual factor, would have been associated with patient aggression in the non-psychiatric nursing groups. Nevertheless, the longitudinal design of the final study allowed us to make inferences about the causal relationships of the selected exposing factors (Carlson & Morrison 2009).

The internal validity of the longitudinal cohort study is weakened by a loss of participants in the follow-up (Carlson & Morrison 2009), which was great in this study (over 40%), i.e. bias can affect the inferences drawn from the study (Dettori 2011). It might be that our follow-up time (approximately 4 years) was too long and resulted in nurses possibly changing the organization for which they worked. It is also possible that those who experienced the most serious problems in workplace relationship and environment factors, for example, left their workplaces before the follow-up, therefore causing the results to be biased (Dettori 2011). Unfortunately, we did not examine the differences in the participants who dropped out and who continued the study. However, the percentage of those lost before the follow-up was approximately the same in all three nursing groups, which supports the internal validity of the study (Dettori 2011). Our original sample was quite large, so the sample sizes obtained in the follow-up were reasonable, especially in the psychiatric and medical and surgical nursing groups. Unfortunately, the sample size obtained at the follow-up for emergency nurses ( $n = 174$ ) was quite small, and possibly lacked the power to detect all existing associations.

Internal validity of observational research also considers if alternative explanations have been appropriately ruled out (Carlson & Morrison 2009), which relates to both the cross-sectional and longitudinal assessment of the associations between the exposing factors and patient aggression (Carlson & Morrison 2009). We did not have any information on the most important risk factors for patient aggression, such as certain patient characteristics like severe mental disorders (Amoo & Fatoye 2010, Dack et al. 2013), a history of aggressive behavior (Dack et al. 2013, Ekinci & Ekinci 2013, Steward & Bowers 2013) or a history of substance abuse (Dack et al. 2013, Steward & Bowers 2013). Other factors that could possibly increase the risk of patient aggression are overcrowding in the units (Virtanen et al. 2011) and unit size. These factors might explain the results of the study, but unfortunately, it was not possible to take them into account in our analyses. However, we included all possible nurse characteristics in our analyses as covariates that have been associated with aggression in previous studies, and part of the cross-sectional assessments were done in a way that considered unit size as a proxy measure of the number of respondents in each unit (Paper II). Regarding longitudinal assessments, the nurse characteristics that could be assumed to not change during the follow-up time, or that told something about the situation during the follow-up, were taken into account (such as gender and profession), thus supporting the internal validity of the study.

The construct validity of this study is hindered by the weaknesses regarding the use of self-report measures mentioned about the study regarding sub-aim I (see assessment of study regarding Sub-aim I and Fowler 2009). However, the validity of the exposure measures used in this study is supported by the fact that almost all the instruments have previously been used in large epidemiological surveys (see e.g. Kivimäki et al. 2002, Elovainio et al. 2002, Ylipaavalniemi et al. 2005, Kivimäki et al. 2007, Virtanen et al. 2009, Nabi et al. 2013, Oksanen et al. 2013). The validity of some of the measures has been studied previously in the Finnish population (see e.g. Kivimäki et al. 1999, Holi et al. 2003, Kouvonen et al. 2006, Juvani et al. 2014). However, it is necessary to consider the possible bias of the outcome assessment in this study (Carlson & Morrison 2009). The outcome assessment (i.e. patient aggression) relied on nurses' recollections regarding patient aggression from the previous 12 months, which may have, in fact, resulted in an over- or underestimation of patient aggression. However, underreporting is common irrespective of the method used in assessment (Iennaco et al. 2013). The validity of the measure is supported by findings of increasing risk of physical aggression related to patient overcrowding in earlier studies, which were discovered using the earlier version of the measure (Virtanen et al. 2011).

Regarding reliability, the internal consistency statistics (Pittman & Bakas 2010) of almost all the measures used in this study to reach sub-aims II–IV were calculated (8/10 of the measures used, see Papers III–IV). The internal consistency value statistics mainly ranged between 0.74 and 0.93 for the Cronbach's alpha, and for a categorical measure of patient aggression, the KR20 was 0.70–0.77, which suggests that the internal consistencies were respectable to excellent (see Pittman & Bakas 2010). Only one scale, the Effort-Reward Imbalance scale's reward subscale, demonstrated acceptable internal consistency. These factors support the reliability of the chosen measurement (Pittman & Bakas 2010).

The external validity of the study is supported by the large geographical area covered, as described in the assessment of study regarding sub-aim I (Carlson & Morrison 2009). However, the sample sizes were smaller in the studies regarding study aims II–IV due to the great loss in participants before the follow-up in the

longitudinal study. Especially the sample size obtained for emergency nurses is quite small (174 nurses), which poses a problem for the generalizability of the findings. In the sample, the proportions of men and women and professional statuses somewhat differed from those observed in earlier studies of emergency nurses in Finland (e.g. Mikkola et al. 2017), which also questions the generalizability of the findings. The results of this study can therefore be generalized to Finnish healthcare settings, especially regarding the results obtained for the psychiatric and medical and surgical nurses, and with caution, regarding emergency nurses. The generalizability of the study to other countries is, as in the study regarding sub-aim I, uncertain because healthcare systems and the organization of care vary between countries. Therefore, the decision regarding the generalizability to other countries is again left up to the reader.

## **6.2 Discussion of the main findings**

### **Occurrence, characteristics and consequences of patient aggression (Sub-aim I)**

This study reports the novel finding that the consequences of patient aggression on wellbeing consequences may be more severe among nurses in non-psychiatric settings compared to their counterparts in psychiatric settings. The consequences were found to be more severe in terms of sleep disturbances among emergency nurses, while sleep disturbances and psychological distress were greater among nurses in medical and surgical nurses. According to the author's knowledge, there are no highly similar studies to compare this study with, although one previous investigation reported an association between experiences of aggression and psychological distress in non-psychiatric nurses, where such an association was not found in the case of psychiatric nurses (Merecz et al. 2006). It is possible that psychiatric nurses are simply more educated in managing aggression (see e.g. Cowman et al. 2017, Alyaemni & Hana 2016, Kitaneh & Hamdan 2012), which may also protect them from the consequences of aggression. This assumption is supported by findings of decreased anxiety, insomnia symptoms and social dysfunction connected with increase in hours of aggression management training over the course of a nurse's career (Lee et al. 2015).

It is also possible that psychiatric nurses are simply more used to experiencing aggression, thus explaining the differences in the consequences on wellbeing. This is supported by results of qualitative studies, which have reported experiences of aggression being an unavoidable part of the job (Lantta et al. 2016) and problems even recognizing verbal aggression as violence (Stevenson et al. 2015). However, according to the results of this study, emergency nurses experience more aggression in terms of overall experiences, mental abuse and physical assaults, and thus, the explanation does not apply to the differences detected regarding psychiatric and emergency nurses. Therefore, it is also possible that interventions for coping after these events are implemented more routinely in psychiatric settings, an issue highlighted in the guidelines regarding workplace aggression (ILO et al. 2002, NICE 2015).

### **Exposing factors of patient aggression at the individual, relationship and work environment levels (Sub-aims II–IV)**

The results of this study show that nurses' individual characteristics are not good predictors of exposure to aggression, although we did find some demographics that were associated with increased exposure to patient aggression. In psychiatric settings, nurses' sex, age, number of years in a current position, professional status

and form of regular working hours were related to patient aggression, while in medical and surgical specialties the results were similar regarding age, sex and professional status. No significant demographic characteristics were found in emergency settings. The results of this study are in accordance with the findings of previous studies, but differing results have also been reported (see e.g. Zampieron et al. 2009, Kelly et al. 2015, Shea et al. 2017, Stutte et al. 2017, Abed et al. 2016, Shafran-Tikva et al. 2017, Gillespie et al. 2017, Cheung et al. 2017).

Regarding the other individual characteristics, such as negative affect and psychological distress of nurses, the results of this study show that they are not good predictors of exposure to patient aggression. The results of this study are somewhat contradictory to those obtained in previous studies; Rodwell et al. (2013) found an increasing occurrence of threats of assaults connected to negative affectivity in frontline nurses. The contradictory results may be explained by the differing measures used to assess negative affect. This previous study used an instrument specifically designed for the assessment of negative affect (Rodwell et al. 2013), while in the current study, negative affect was assessed as trait anxiety. It is possible that the trait anxiety measure used in this study did not capture negative affect, *per se*, thus explaining the differing results. However, slightly differing findings have been reported in previous studies, where those who have had high stress reactivity social conflict (e.g. feeling irritated and upset) have been found to be less exposed to patient aggression (Kelly et al. 2015). Psychological distress has also been linked to an increased exposure to patient aggression in previous studies (Magnavita & Heponiemi 2012), whereas such an association was not found in this study. We have no explanation for the variation in these results; however, the different settings may be an explanation. Magnavita's and Heponiemi's (2012) study was conducted in Italian public hospitals with many different types of professionals from a variety of medical specialties, while the current study only assessed the association between these factors in psychiatric settings.

The results of this study show that improvement of relationship factors at the workplace may be useful to take into consideration when aiming at reducing patient aggression in healthcare. More specifically, the findings indicated that a poor team climate may expose nurses to patient aggression in medical and surgical specialties. This is the first study to find a longitudinal association between team climate and patient aggression. However, this finding is in accordance with the findings of previous studies. Esthryn-Behar et al. (2008) detected an increasing occurrence of aggression linked with poor and medium quality of teamwork in their cross-sectional analysis, while other studies have reported findings of poor social support and increasing odds for both physical (Magnavita 2013) and verbal aggression (Magnavita 2013, Magnavita 2014) in a longitudinal analysis. It is possible that a positive team climate may promote the staff's ability to react and respond to patient aggression, thus explaining the association with patient aggression. Further, it is also possible that a positive team climate leads to a calmer atmosphere on the healthcare unit, thus also serving to reduce patient aggression. A previous longitudinal study found that implementing a quality improvement intervention that incorporated elements for team functioning improved team climate, which in turn, improved the quality of care (Cramm et al. 2014), which represents the modifiable nature of this factor.

The results of this study show that improving nurses' work environments, in terms of relieving job strain, balancing the efforts and rewards of the work and improving organizational justice, may be useful when aiming to reduce patient aggression in healthcare. The finding of this study regarding the association between job

strain and increasing occurrence of patient aggression is consistent with the findings of previous investigations using a longitudinal design (Magnavita 2013, Magnavita 2014). There are several possibilities for the mechanism underlying the relationship between these factors and patient aggression: For instance, the cyclical model of violence (Whittington & Wykes 1994) explains the increasing occurrence of patient aggression in cases of staff stress by the effect of stress on nurses' ability to interpret patient behavior correctly, which can result in an inappropriate selection of nursing interventions. The model also proposes that stress might increase nurses' avoidance of patient contact or hostile behavior towards patients, thus increasing the aggressive behavior (Whittington & Wykes 1994). On the other hand, this relationship might be explained by the effect of job strain on nurses' cognitive performance (Vuori et al. 2014, Elfering et al. 2011). Task stressors have been found to impair staff's attention regulation (Elfering et al. 2011), which may possibly result in nurses' failure to notice the early signs of aggression in patients, a mechanism previously suggested to explain the association between healthcare staff's job strain and workplace aggression (Magnavita 2013). Furthermore, task stressors have been found to increase the failure also in action exertion (Elfering et al. 2011), which may deteriorate nurses' ability to respond appropriately to challenging situations or patient demands, thus explaining the increased occurrence of patient aggression.

This is the first study, according to the author's knowledge, to detect a significant association between high effort-reward imbalance and increased occurrence of patient aggression. However, the results of this study are supported by findings of previous studies that have linked high effort-reward imbalance with problems in patient care quality (Paquet et al. 2013, Loebroks et al. 2016). The model of effort-reward imbalance assumes that inadequate reciprocity in efforts spent and rewards received in turn is likely to increase recurrent negative feelings (Siegrist 1996). These negative feelings may include lowered work motivation. It is possible that low work motivation among nurses may result in low commitment to aggression-prevention practices, thus explaining the association between these factors. Moreover, low work motivation may increase avoidance of patient contact, which in turn, has been associated with increased occurrence of problematic behavior in care environments in qualitative studies (Larsen & Terkelsen 2014).

This is the first study, according to the author's knowledge, to detect significant longitudinal associations between organizational justice and patient aggression. However, the results of this study are consistent with results of reports of cross-sectional studies published previously (see e.g. Park et al. 2015, Magnavita & Heponiemi 2012). Park et al. (2015) found that nurses' low perceptions of justice, e.g., a fair way of resolving conflicts in the workplace, might increase the odds for both physical and verbal aggression. Similar results were obtained in another study, where an association between low justice perceptions and increasing occurrences of non-physical aggression among healthcare staff was detected (Magnavita & Heponiemi 2012). There may be several different explanations for the results obtained in this study and those of previous investigations. Low organizational justice has been found to be linked with poor work ability (Spanier et al. 2014), which may also be seen in problems managing patient aggression, thus explaining the higher occurrence. Moreover, previous research suggests that poor justice perceptions in the workplace may increase negative behavior in work groups (Priesemuth et al. 2013) and result in intragroup conflicts among nurses (Almost et al. 2010). It is therefore possible that low organizational justice may not only increase negative behavior towards work group members, but also towards patients—a factor that has been associated with an increased occurrence of patient aggression in previous studies (Papadopoulos et al. 2012).

In this study, various relationship and work environment factors were identified as exposing factors of patient aggression in non-psychiatric settings, while none were found in psychiatric settings in the longitudinal study after final adjustments. This may indicate that there are some specific features in the non-psychiatric care settings that make the environments more vulnerable to patient aggression that is induced by the problems in the relationship and work environment levels. The vulnerability of non-psychiatric settings may be explained by the lack of education in managing patient aggression. Over 80% of staff working in psychiatric settings reported having been educated in the management of patient aggression (Cowman et al. 2017), while in non-psychiatric settings, 13% of staff reported related education (Kitaneh & Hamdan 2012). A recent study on emergency nurses showed that almost 83% reported not being educated in handling patient aggression (Alyaemni & Hana 2016).

In this study, the Socio-Ecological Model for prevention of patient-to-worker aggression in hospitals (Arnetz et al. 2015) was used as a theoretical framework. The Socio-Ecological Model has been used to explain and plan the prevention of different types of aggression (e.g. Dahlberg & Krug 2002, Gillespie et al. 2015, CDC 2018) and other health-related problems (see e.g. Townsend et al. 2013, Qiao et al. 2015). The benefit of using the Socio-Ecological Model is that it allows the identification of risk factors on multiple levels, and thus allows the development and selection of interventions targeting the multiple-level risk factors identified (Arnetz et al. 2015). Therefore, the approach allowed the exploration of the nurse-related factors on the first three levels of the model in this study. Unfortunately, the factors at the fourth level, organization, which refer to, e.g., hospital policies regarding workplace aggression and patient and employee safety (Arnetz et al. 2015), were beyond the scope of this study. However, the identification of the exposing factors on the levels chosen for this study allow the planning of necessary procedures at the organization level, as well. There is still a lack of knowledge on how these multiple factors identified on different levels in this study interact together simultaneously and contribute to patient aggression, an assumption in the Socio-Ecological Model (Arnetz et al. 2015), which needs to be addressed by future studies. Long-term impacts of problems in these relationship and work environment-level factors on employee wellbeing are already known (Elovainio et al. 2005, Sinokki et al. 2009, Wahrendorf et al. 2012, Juvani et al. 2014), and the results of this study suggest that the impact may also be seen in the increased occurrence of patient aggression in the long term. Therefore, based on the results of this study, it is advisable to take these multiple level factors into account when planning initiatives for managing this global challenge—aggression towards healthcare staff.

### **6.3 Recommendations**

The socio-ecological approach assumes that exposing factors of patient aggression arise at different levels, and thus require interventions on the multiple levels (Arnetz et al. 2015). Therefore, the recommendations are given separately for the different levels (individual, relationship and work environment) of exposing factors studied. Based on the exposing factors identified at these levels, recommendations for the organizational level are also given. Finally, recommendations for future studies are discussed.

### **Individual level**

- Nurses' individual characteristics do not seem to be useful in the prevention of patient aggression in, for example, personnel structure planning, taking into account the discrepancies between the results of previous studies and this study. However, based on our results, individuals should, especially in emergency settings where patient aggression is common, seek to participate in aggression management training. Also, seeking support after aggressive incidents seems advisable, not only in psychiatric settings, but in non-psychiatric settings, too.

### **Relationship level**

- Improving the team climate may be useful in minimizing patient aggression, especially in medical and surgical specialties. This refers to increasing participative safety, support for innovation, task orientation and vision. Proudfoot et al. (2007) offer the following suggestions for improvement of team climate in healthcare, which seem advisable based on the results of this study: establish suitable leadership; set up good communication structures, e.g. joint meetings, in which participative decision making and sharing of work-related ideas and information is supported; allocate time, resources (financial, administrative, training) and practical support for developing new ideas and ways of working; clarify clinical and non-clinical goals, and check the degree to which they are shared and perceived achievable by members of the team.

### **Work environment level**

- Relieving nurses' job strain, especially in medical and surgical specialties, may be useful in the prevention of patient aggression. Therefore, it seems advisable for healthcare managers and organizations to take into consideration ensuring for nurses an appropriate degree of autonomy and opportunities for skill development, and prevention of work overload and excessive work pace, as recommended in the "Framework guidelines for addressing workplace violence in the healthcare sector" (ILO et al. 2002).
- Emergency settings in particular might benefit from implementing procedures for balancing the efforts and rewards at work when aiming to reduce patient aggression. Suggestions offered by the effort-reward imbalance model for tackling this issue are, for example, improvement of leadership by means of providing an esteem award, compensatory wage systems, and models of gain sharing and strengthening non-monetary gratifications (Siegrist 2010).
- Improving organizational justice in the workplace may also be useful to consider when trying to reduce patient aggression, especially in emergency settings. Nursing leaders at different levels should ensure that decision-making procedures include input from all those affected, are ethical and amendable, suppress bias, are consistently applied and are accurate. Polite, fair, and considerate treatment of individuals should be ensured. It also might be advisable for organizations to organize brief training for leaders on the subject, because it has been found to improve employee perceptions of

organizational justice, especially among the employees who have lowest perceptions (Nakamura et al. 2016).

**Organization level**

- It would be advisable for organizations to establish procedures for the after-care of aggressive incidents, as highlighted in several guidelines (ICN 2007, ILO et al. 2002, NICE 2015), not only in psychiatric settings, but in non-psychiatric settings, too, as the consequences of patient aggression may be more severe in non-psychiatric settings.
- Organizations should establish routine procedures for offering education related to aggression management in non-psychiatric settings as well, especially in emergency settings, where aggression is common, an issue also highlighted in several guidelines (e.g. ILO et al. 2002, Ministry of Social Affairs and Health 2011).
- Organizations might benefit from following the situation related to the exposing factors identified at the relationship and work environment levels as a part of routine assessment of employee wellbeing, enabling organizations to identify problems at these levels early on and offer level-specific interventions.

**Future studies:**

- Longitudinal research is needed to determine whether consequences of patient aggression on nurses' wellbeing are more severe in non-psychiatric settings compared to psychiatric settings.
- Longitudinal research is needed to explore how patient aggressive behavior changes and adapts to the changes in care environment.
- Research with more balanced sample sizes and a more effective follow-up system needs to be conducted to determine whether the factors at the relationship and work environment levels that can expose nurses to aggression vary between different nursing specialties, and to determine if nurses in non-psychiatric settings are indeed more vulnerable to patient aggression induced by problems at the relationship and work environment levels.
- Future research should be conducted with designs that take into account the characteristics of the patients treated in healthcare services.
- Longitudinal research is needed to determine how the factors identified at the relationship and work environment levels interact and possibly contribute to the occurrence of patient aggression.
- Longitudinal research is needed to determine whether aggression management education protects nurses from being vulnerable to patient aggression induced by the problems at the relationship and work environment levels.

- Interventions for modifying the relationship and work environment levels need to be developed and tested from the point of view of aggression prevention in healthcare. It should also be determined whether modifying these factors is actually beneficial in the efforts to minimize patient aggression.

## **7 CONCLUSIONS**

The results of this study reveal the complex nature of patient aggression in healthcare. According to these results, healthcare environments may benefit from taking into account nurses' relationship and work environment factors when aiming to reduce patient aggression.

More specifically, relationship factors, in terms of improving team climate, may be beneficial. This refers to increasing participative safety (interaction between team members in an interpersonally participative and non-threatening climate), support for innovation (support for innovation attempts, such as cooperation to develop and apply new ideas), task orientation (a climate that supports adoption of improvements, and an overall commitment to excellence in task performance) and vision (focus on realistic and clear objectives in which the team members are committed) among staff members.

Work environment factors, in terms of relieving nurses' job strain by, for example, ensuring the appropriate degree of decision authority and skills discretion, together with prevention of excessive workload and pace of work, may be useful based on the results of this study. Also, taking into account the balance of efforts and rewards (such as esteem, salary and promotion prospects) of the work may serve to support reduction of aggression. Further, increasing organizational justice, by paying attention to justness in the decision-making practices and polite, fair and considerate treatment of nurses, may be beneficial.

The results of this study indicate that non-psychiatric care environments may be more vulnerable to patient aggression induced by problems at the relationship and work environment levels, and therefore may benefit from modifying the factors at these levels more than psychiatric care environments in terms of aggression prevention. The factors at these levels, however, were found to vary between non-psychiatric care environments. More studies are needed to confirm the findings of this study.

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## APPENDIX 1

In order to review the exposing factors of patient aggression related to nurses' characteristics at the individual, relationship and work environment levels, a search for literature was conducted (non-systematic, modification of the targeted review method [Huelin et al. 2015]). This was performed using three electronic databases: Cinahl, Pubmed (Medline) and Cochrane Library (February 2015, updated in March 2018). The following terms and their combinations were used in the search, constructed by an information specialist: violence, aggression, assault, patient, nurse, nursing staff and hospital. Table 13 shows the search terms and restrictions used in each database. The literature related to the demographic characteristics of the individual level was selected from an updated search conducted in March 2018 only. The search resulted in a total of 3,021 references.

**Table 13.** Search terms and restrictions used in each database

Database and restrictions	Search terms
<b>CINAHL</b> 2004 Peer-reviewed English Abstract available	(MH "Violence+" OR MH "Aggression+" OR TI" violence*" OR TI"aggression*" OR TI"assault*" OR AB"violence*" OR AB"aggression*" OR AB"assault*") AND (MH "Patients+" OR AB"patient" OR TI"patient*") AND (MH "Nurses+" OR MH "Nursing Staff, Hospital" OR TI"nurse*" OR TI"nursing*" OR AB "nurse*" OR AB" nursing*")
<b>PUBMED</b> 2004 Peer-reviewed English Abstract available	("Violence"[Mesh] OR "Aggression"[Mesh] OR violence*[tiab] OR aggression*[tiab] OR assault*[tiab]) AND (patient[tiab] OR patients*[tiab] OR "Patients"[Mesh]) AND (nurse*[tiab] OR nursing*[tiab] OR "Nurses"[Mesh] OR "Specialties, Nursing"[Mesh] OR "Nursing Staff, Hospital"[Mesh] OR "Nursing Staff"[Mesh])
<b>COCHRANE</b>	(violence* OR aggression* OR assault*) AND patient* AND (nurse* OR nursing* OR health NEXT care NEXT worker*OR health NEXT personnel*)

Titles of the references were first screened, followed by the screening of abstracts, and finally, full-texts. Studies were selected based on the following inclusion criteria: 1) quantitative research design (both cross-sectional and longitudinal), 2) conducted in a healthcare setting, 3) reports on the individual, relationship or work environment factors pertaining to the staff (relevant to the definitions used in this study), in relation to aggression from external sources (patients, visitors), 4) if internal aggression (staff-to-staff) is reported, it is reported separately from external sources, or the reported aggression is over 50% of the external sources, 5) if a cross-sectional design is used, the study assumes that the factors are causes rather than consequences, 6) published during the last 14 years, and 7) available in English.. Altogether, 30 studies met these criteria.

Additional searches were conducted to understand the context of this thesis: organization, use and workforce of specialized healthcare services in Finland, regulations and guidelines related to workplace aggression, definitions of aggression, models explaining aggression and occurrence, characteristics and consequences of patient aggression. Searches were conducted using the electronic database, PubMed (Medline), and the Google search engine. Webpages of national and international organizations relevant for the topic were reviewed: for example, the Ministry of Social Affairs and Health, Valvira, the National Institute of Health and Welfare, the World Health Organization, the International Council of Nurses, the International Labor Organization and the

National Institute of Health and Care Excellence. In addition, manual searches were conducted from the relevant publications identified.

## APPENDIX 2

## Appendix 2. Instruments and what they measure in this study

Sub-aim	Instrument	Definitions and/or example items (**)	Paper
I Consequences of patient aggression	Self-rated health <sup>1</sup>	Nurses' perceived health status	I
	Sleep disturbances <sup>2</sup>	The nighttime insomnia symptoms of DSM-IV (4 <sup>th</sup> edition) in the last four weeks ('how often did you have trouble falling asleep', 'Have you woken up several times per night', 'Have you had trouble staying asleep including waking up too early', 'Have you felt tired after a normal night's sleep')	I
	Psychological distress (GHQ-12) <sup>3</sup>	Common mental disorders and psychiatric wellbeing reflecting the level of psychological distress (focused on depression, anxiety, self-confidence and social interaction)	I
II Individual factors	Work Ability Index (WAI) <sup>4</sup>	Nurses' perception of their current work ability compared with the lifetime best	I
	Negative affect (Trait anxiety, STAI) <sup>5</sup>	Tendency to react with anxiety in stressful situations, personality trait, ('I feel calm', 'I am relaxed', 'I feel satisfied' 'I feel tense', 'I feel upset', 'I am worried')	II, IV
III Relationship factors	Psychological distress (GHQ-12) <sup>3</sup>	See Sub-aim I	III
	Team climate (TCI-14) <sup>6</sup>	Consists of four factors: 1) Participative safety, interaction between team members in an interpersonally participative and non-threatening climate; 2) Support for innovation, the enacted support for innovation attempts, such as co-operation to develop and apply new ideas; 3) Task orientation, a climate supporting adoption of improvements, involves an overall commitment to excellence in task performance; 4) Vision, focusing on realistic and clear objectives in which the team members are committed Based on Wests' four factor theory of innovation <sup>13</sup>	III*,IV
	Workplace social capital <sup>7</sup>	Two components: 1) cognitive social capital: beliefs, values and attitudes (trust, reciprocity and solidarity shared among members of the workplace); 2) Structural social capital, forms through horizontal organizations that have transparent and collective decision-making procedures, accountable leaders, practices of collective action and mutual responsibility	II
IV Work environment factors	Satisfaction with leadership <sup>8</sup>	'the amount of support and guidance received from supervisor', 'the degree of respect and fair treatment received from boss', 'the overall quality of supervision received at work'	II,IV
	Job strain (JCQ) <sup>9</sup>	Consists of two components: 1) Job demand, workload and pace of work 'Do you have to hurry to get your work done?'; 2) Job control, decision authority and skills discretion 'My job allows me to make a lot of decisions on my own', 'I have an opportunity to develop my own special abilities'. Job strain is a combination of these two components: high job demands and low job control; based on the job strain-model	II,IV
	Effort-reward imbalance <sup>10</sup>	Mismatch between high effort at work and low rewards in return (esteem, salary, promotion prospects), based on effort-reward-imbalance model	II,IV
	Job insecurity <sup>11</sup>	Insecurity threats, such as being given notice, being laid lay-off, becoming redundant, and transferred to other jobs	II,IV
	Participation in decision making <sup>11</sup>	Possibilities to participate in the planning regarding changes in work; 'changes are often unexpected, without possibility influence them', 'possibility to influence to some extent', 'I can influence the changes to a great extent'	II
	Organizational justice <sup>12</sup>	Consists of two factors: 1) Procedural justice, the extent that decision-making procedures include input from all those affected, are ethical and amendable, suppress bias, are consistently applied and are accurate; <sup>14</sup> 2) Relational justice, polite, fair and considerate treatment of individuals <sup>15</sup>	III,IV

<sup>1</sup>Kivimäki et al. 2003, <sup>2</sup>Jenkins et al. 1988, <sup>3</sup>Goldberg 1972, <sup>4</sup>Ilmarinen et al. 1997, <sup>5</sup>Spielberger et al. 1983, <sup>6</sup>Anderson & West 1998, Kivimäki et al. 1999, <sup>7</sup>Kouvonen et al. 2006, <sup>8</sup>Hackman et al. 1975, Virtanen et al. 2009 <sup>9</sup>Karasek & Theorell 1990, Laine et al. 2009, <sup>10</sup>Siegrist 1996, Kivimäki et al. 2007, <sup>11</sup>Kivimäki et al. 2000, <sup>12</sup>Moorman 1991, Elovainio et al. 2002, <sup>13</sup>West 1990, <sup>14</sup>Leventhal 1980, <sup>15</sup>Bies & Moag 1986 \*In Paper III, only TCI-14 subscales participative safety and support for innovation were used to reflect collaboration among nurses.

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