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Camilla Långstedt

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To my children Nea and Roni

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ABSTRACT

Persons with schizophrenia spectrum disorder (SSD) have a shorter life expectancy than the general population, mainly due to physical comorbidities. However, current health screening practices are inadequate for the needs of this patient group. The aim of this mixed methods study was to examine the implementation of physical health screening in persons with schizophrenia spectrum disorder using the Finnish Health Improvement Profile (HIP-F) tool. The face and content validity, clinical utility, perceptions of nurses and patients, and implementation fidelity and related factors of the HIP-F were described. The study applied a socio-ecological model, which enabled the examination of factors related to the implementation of health screening at several levels.

The study was conducted in three phases. First, the face and content validity of the HIP-F tool and its potential clinical utility, was evaluated using questionnaires. Second, nurses' and patients' perceptions of HIP-F and suggestions for improvement were assessed. Perceptions were collected from nurses through group interviews, and from patients through individual interviews, in a semi-structured manner. Third, nurses' implementation fidelity was assessed using a survey and related factors were assessed using interviews. The survey data were analyzed using statistical methods and the interview data using content analysis. The findings from all phases were combined and presented as a single, cohesive report in the discussion section of this study.

The HIP-F tool demonstrated acceptable face validity, moderate content validity, and potential clinical utility in detecting health risks in patients with SSD. It was found to be comprehensive, to support patient engagement, and to enhance understanding of physical health. Patients found the HIP-F tool easy to use, but most nurses found it time-consuming and difficult to use. Nurses' implementation fidelity was low and influenced by their work tasks, limited resources, and patient-related factors. This dissertation provides knowledge that can be utilized in clinical practice, in healthcare administration, in research on nursing science, and in nursing education with the purpose of improving screening practices. Further research is needed to examine the effectiveness of physical health screening, nurse-patient interaction, organizational readiness, and the gap between clinical guidelines and practice.

KEYWORDS: schizophrenia spectrum disorder, physical health, screening, implementation

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TIIVISTELMÄ

Skitsofreniakirjon häiriötä sairastavien henkilöiden elinajanodote on valtaväestöä lyhyempi, pääosin fyysisten liitännäissairauksien vuoksi. Nykyiset terveysseulontakäytännöt ovat kuitenkin riittämättömiä tämän potilasryhmän tarpeisiin. Tämän monimenetelmällisen tutkimuksen tarkoituksena oli tarkastella fyysisen terveysseulonnan toteuttamista skitsofreniakirjon häiriötä sairastavilla henkilöillä käyttäen Finnish Health Improvement Profile (HIP-F) seulontatyökalua. Tutkimuksessa arvioitiin HIP-F:n näennäis- ja sisältövaliditeettia, kliinistä käyttökelpoisuutta, hoitajien ja potilaiden käsityksiä siitä, sekä menetelmäuskollisuutta ja siihen liittyviä tekijöitä. Tutkimuksessa sovellettiin sosioekologista mallia, joka mahdollisti terveysseulonnan toteutukseen liittyvien tekijöiden tarkastelun useilla tasoilla.

Tutkimus tehtiin kolmessa vaiheessa. Aluksi HIP-F seulontatyökalun näennäis- ja sisältövaliditeettia sekä kliinistä käyttökelpoisuutta arvioitiin kyselyin. Seuraavaksi käsityksiä HIP-F:sta sekä siihen liittyviä parannusehdotuksia kerättiin hoitajilta ryhmähaastatteluin ja potilailta yksilöhaastatteluin, puolistrukturoidusti. Lopuksi hoitajien menetelmäuskollisuutta arvioitiin kyselyllä ja siihen liittyviä tekijöitä haastatteluin. Kyselyaineisto analysoitiin tilastollisilla menetelmillä ja haastatteluaineisto sisällönanalyysillä. Vaiheiden tulokset integroitiin ja esitettiin yhtenäisenä raporttina tutkimuksen pohdintaosiossa.

HIP-F seulontatyökalu osoitti hyväksyttävän näennäisvaliditeetin, kohtalaisen sisällöllönvaliditeetin ja mahdollisen kliinisen käyttökelpoisuuden terveysriskien tunnistamisessa skitsofreniakirjon häiriötä sairastavilla henkilöillä. Sen todettiin olevan kattava, tukevan potilaiden sitoutumista hoitoonsa sekä lisäävän heidän ymmärrystään fyysisestä terveydestä. Potilaat kokivat HIP-F seulontatyökalun helppokäyttöiseksi, mutta useimmat hoitajat kokivat sen aikaa vieväksi ja vaikeaksi käyttää. Hoitajien menetelmäuskollisuus oli matala, mihin vaikuttivat työtehtävät, resurssien puute ja potilaaseen liittyvät tekijät.

Tämän väitöskirjan tuottamaa tietoa voidaan hyödyntää kliinisessä hoitotyössä, terveydenhuollon hallinnossa, hoitotieteellisessä tutkimuksessa ja hoitotyön koulutuksessa. Lisää tutkimusta tarvitaan fyysisen terveysseulonnan vaikuttavuuden, hoitaja-potilasvuorovaikutuksen, organisaation valmiuden sekä kliinisten ohjeiden ja käytännön välisen kuilun tarkastelun näkökulmista.

AVAINSANAT: skitsofreniakirjon häiriö, fyysinen terveys, terveysseulonta, implementointi

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Abbreviations

APA	American Psychiatric Association
BMI	Body Mass Index
CFIF	Conceptual Framework for Implementation Fidelity
CINAHL	Cumulative Index to Nursing and Allied Health Literature
COREQ	Consolidated Criteria for Qualitative Studies
CVI	Content Validity Index
DALYs	Disability-Adjusted Life Years
GDPR	General Data Protection Regulation
GRAMMS	Good Reporting of a Mixed Methods Study
HDL	High-Density Lipoprotein
HR	Hazard ratio
HIP	Health Improvement Profile
HIP-F	Finnish Health Improvement Profile
ICD-11	International Classification of Diseases- 11
I-CVI	Item Content Validity Index
IQR	Interquartile range
IPAQ	The International Physical Activity Questionnaire
Md	Median
MetS	Metabolic Syndrome
MSAH	Ministry of Social Affairs and Health
NICE	National Institute for Health and Care Excellence (UK)
S-CVI	Scale Content Validity Index
S-CVI/Ave	Scale-level Content Validity Index, Average method
SMI	Severe mental illness
SD	Standard deviation
SSD	Schizophrenia Spectrum Disorder
TENK	The Finnish National Board on Research Integrity
WHO	World Health Organization

List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

I Werkkala, C., Välimäki, M., Anttila, M., Pekurinen, V., & Bressington, D. (2020). Validation of the Finnish Health Improvement Profile (HIP) with patients with severe mental illness. *BMC Psychiatry*, *20*, 1-15.

II Långstedt, C., (former Werkkala), Bressington, D., & Välimäki, M. (2024). Nurses' and patients' perceptions of physical health screening for patients with schizophrenia spectrum disorders: a qualitative study. *BMC Nursing, 23*(1), 321.

III Långstedt, C., (former Werkkala), Bressington, D., & Välimäki, M. (2025). Understanding Implementation Fidelity of Physical Health Screening in Mental Health Nursing: A Mixed Methods Study. *Issues in Mental Health Nursing*, *46*(3), 267-279.

1 Introduction

Mental health disorders are a worldwide health concern, schizophrenia spectrum disorders (SSDs) being one of the most burdensome (He et al., 2020). Persons diagnosed with SSD face not only mental health challenges, but also high risk for physical health problems. Factors contributing to this are multifaceted and complex, including e.g. genetic burden, illness-related symptoms, unhealthy lifestyle, side-effects of antipsychotics, insufficient health care and stigma (Castle & Li, 2023; Firth et al., 2019; Rezayat et al., 2019; Šagud et al. 2019). Physical illnesses, e.g. diabetes, cardiovascular disease and metabolic syndrome (MetS) are common in this patient group (Castle & Li, 2013). Most often because of comorbidities, persons with schizophrenia spectrum disorder have a 10- to 25-year decrease in life expectancy in comparison to people without SSD (Goldstone, 2020). This emphasizes the importance and timeliness of comprehensive health screening to identify health risks at an early stage, which, without detection and intervention, can have serious consequences for persons with SSD.

Implementing physical health screening is critical in detecting current physical health risks, preventing future health issues and improving life expectancy. Several evidence-based clinical guidelines have already been developed in order to improve physical health screenings (Lehman et al., 2010; National Institute for Health and Care Excellence [NICE], 2014; Schizophrenia. Current Care Guideline, 2024). These guidelines recommend regular assessment of e.g. cardiometabolic risk factors, metabolic syndrome, and health behaviour. However, despite recommendations, screening rates remains globally low and suboptimal in clinical mental health nursing (Firth et al., 2019; McGinty et al., 2015). Lack of systematic implementation of evidence-based practices has been reported as a primary barrier to effective screening (Bighelli et al., 2016). In addition, while nurses have frequently been emphasized as front-line professionals for conducting screenings, they have reported insufficient knowledge, skills, resources and role clarity related to screening practices (Happell et al., 2012b; Happell et al., 2013).

Existing literature of implementing physical health screening in persons with SSD is limited. Earlier studies have presented mainly how prevalent different physical health problems are among persons with SSD (Cook et al., 2015) and

nurses' general views and attitudes regarding somatic health care and monitoring (Happell et al., 2013; Mwebe, 2017). To date, there is a lack of integrated evidence on both nurses' and patients' experiences of validated physical health screening tools, particularly regarding their perceived usefulness, implementation fidelity, areas for improvement, and factors influencing successful implementation. However, feeling ownership of the tool can increase nurses' engagement in screening practices (Duff et al., 2020). When implementing health screening for persons with SSD, it is essential to assess whether the tool meets the health needs of the target population. The variables included in the evaluation must comprehensively map the person's individual health needs and be comprehensible to the patient as well, despite cognitive deficiencies (De Hert et al., 2011). Moreover, previous research on physical health screening practices has often focused on individuals with severe mental illness (SMI) (Cook et al., 2015), including also persons with a diagnosis of e.g. bipolar disorder, and major depressive disorder (Gonzalez et al., 2022). This dissertation specifically focuses on persons with SSD.

To my knowledge, no previous published study in Finland has evaluated the validity and clinical utility of any structured, comprehensive, physical health screening tool developed especially for persons with SSD. To address this issue, we conducted a study on implementation of physical health screening for persons with SSD using a comprehensive, structured screening tool, the Health Improvement Profile (HIP) (Shuel et al. 2010; White et al., 2009).

This study was conducted based on a pragmatic approach that emphasizes practical solutions, combining different research methods in order to get answers to a complex phenomenon (Long et al., 2018). The theoretical framework applied in this study was the socio-ecological model (Richard et al., 1996), which helped us find out how the different levels of the model (individual, human relationships, organization, community and politics) are related to the implementation of physical health screening. These levels are used when discussing the integrated results of phases I-III and in order to formulate research conclusions.

This dissertation was conducted within the area of nursing science. In this study, the core nursing metaparadigm concepts, i.e. 'person', 'health', 'environment' and 'nursing' (Fawcett, 1984), are described as follows: the concept of 'person' refers to patients who are diagnosed with SSD and nurses who are treating patients with SSD. Nurses are registered nurses or mental health nurses. 'Health' means mental or physical health. 'Environment' means mental health services offering treatment in outpatient clinics, organizational environment as well as community and health policy. 'Nursing' is seen as the treatment of patients with SSD including both mental health services and physical health screening conducted by nurses.

2 Review of the literature

2.1 Persons with schizophrenia spectrum disorder (SSD)

2.1.1 SSD and its personal, societal and financial impacts

Schizophrenia spectrum disorders (SSDs) are severe and persistent mental illnesses with a moderate prognosis and usually suboptimal long-term outcomes (Peritogiannis et al., 2020). According to the International Classification of Diseases, 11th Revision (ICD-11), SSDs are grouped under "Schizophrenia or other primary psychotic disorders". This category includes conditions such as schizophrenia, schizoaffective disorder, schizophreniform disorder, brief psychotic disorder, delusional disorder, and other specified or unspecified primary psychotic disorders. (World Health Organization [WHO], 2024) Schizophrenia alone is one of the most burdensome and costly diseases worldwide. It is globally listed as one of the most common causes leading to disability-adjusted life years (DALYs). (He et al., 2020)

Schizophrenia spectrum disorders affect millions of people globally, with prevalence varying across populations and regions (Perälä et al., 2008; WHO, 2022). Lifetime occurrence of schizophrenia has been reported to be around 0.48% (Simeone et al., 2015). Around 24 million people worldwide suffer from schizophrenia (0.32%) (WHO, 2022). In 2016, the point prevalence of schizophrenia worldwide, adjusted for age, was estimated at 0.28% (Charlson et al., 2018). In Europe, the occurrence of psychotic disorders is approximately 1.2% (Fasseeh et al., 2018). In Finland, the overall prevalence of all psychotic illnesses was approximately 3.5% in 2012 (Perälä, 2012). It has been reported that schizophrenia occurs more frequently in the northern and eastern regions of Finland, perhaps due to environmental and genetic factors (Perälä et al., 2008).

The precise cause of SSD still remains unknown (WHO, 2022). Physical, genetic, environmental and psychological factors can cause a person to develop SSD (Goldstone, 2020). Some individuals can have a risk of developing SSD, where a stressful life can trigger the condition (Schizophrenia. Current Care Guideline, 2024). A person’s birth and early life factors play a crucial role (Jauhar et al., 2022). The onset of schizophrenia can be understood based on the stress-susceptibility

model, i.e. the stress-vulnerability model. According to the model, schizophrenia breaks out in susceptible persons in interaction with environmental stressors (Schizophrenia. Current Care Guideline, 2024; Wahlberg et al., 1997). Additionally, the causal connection with cannabis use and SSD has been discussed (Johnson et al., 2021).

Schizophrenia spectrum disorders may have different ages for onset, and such disorders may manifest themselves in various ways (NICE, 2014). The onset of SSD, most commonly schizophrenia, typically occurs among men in late adolescence or in their early twenties. In females, the onset occurs among women in between early twenties and early thirties. (NICE, 2014) Childhood-onset schizophrenia is a rare condition but seems to be continued with the adult-onset disorder (Driver et al., 2020). First-episode psychosis often occurs during early adulthood (Skikic & Arriola, 2020). Before the first episode of psychosis, a person may suffer from prodromal symptoms. Prodromal symptoms can include anxiety, sleep disturbances, depression, irritability and suicidal thoughts. The symptoms are temporally related to the onset of psychosis. Before the onset of psychosis, dissociative disorders and obsessive-compulsive phenomena may also occur. (George et al. 2017)

Literature offers different categorizations of symptoms associated with SSD (NICE, 2014). The symptoms are divided into positive and negative symptoms (Goldstone, 2020). These symptoms vary both in different patients and in the same patient in different stages of the disease (Schizophrenia. Current Care Guideline, 2024). Positive symptoms include hallucinations and delusions. Hallucinations can appear as auditory or visual hallucinations. However, tactile, smell or taste hallucinations occur less often. Delusions are rigid, bizarre and unfounded beliefs that a person stubbornly holds on to, even if the facts speak against them. Negative symptoms include limited abstract thinking, decreased speech fluidity and emotional coldness. A person with SSD may suffer from an inability to express emotions or feel pleasure (anhedonia). Negative symptoms can appear as an inability to act spontaneously, a general reluctance and a lack of motivation and will. (NICE, 2014; Schizophrenia. Current Care Guideline, 2024)

Schizophrenia spectrum disorders affect social and professional functioning (Jauhar et al., 2022). This is caused especially by symptoms related to the disease, and by stigma (Belvederi & Amore, 2019; Goldstone, 2020). Positive and negative symptoms can cause problems in social interactions (Goldstone, 2020; NICE 2014). Paranoid delusions, such as the fear of being persecuted or spied on, can lead to a person isolating themselves from social relationships (Schizophrenia. Current Care Guideline, 2024). Social functioning may be affected because of stigma, prejudice and discrimination in our society. For those suffering from SSD, experiences of stigmatization only increase the suffering caused by the illness (Rezayat et al., 2019). Stigma impacts the development of a person's insight and ability to function in a

community (Belvederi & Amore, 2019). In addition to perceived stigma, low educational level and socio-economic status affect a person´s social abilities (Schizophrenia. Current Care Guideline, 2024). SSD is often diagnosed in early adulthood, causing functional challenges (Wang et al., 2020). This often leads to poor chances of employment and risks being left out of the labor market (Pirkola et al., 2020).

Cognitive, neuropsychological and biological factors cause challenges to the behavior and health of a person with SSD (Correll et al., 2022; Engels et al., 2014; Jauhar et al., 2022; NICE, 2014). Cognitive difficulties often manifest themselves as disorganized thought processes and speech. This is characterized by more loose associations, which makes communication illogical and difficult to follow. (NICE, 2014) These cognitive deficits also affect the ability to perceive and express pain (Engels et al., 2014). This, in turn, can delay the diagnosis and treatment of severe illnesses, e.g. cardiovascular disorder (Stubbs et al., 2015) and can also cause life-threatening constipation (Koizumi et al., 2013). Furthermore, impaired cognitive function frequently leads to challenges in treatment adherence (Ghimire, 2017; Kitchen et al., 2012; Peritogiannis et al., 2022). Neuropsychological difficulties, such as reduced attention span, poor short-term memory, and problems with information processing and decision-making, are common (Keshavan & Eack, 2019). Biological factors further complicate these challenges, as individuals with SSD often exhibit accelerated biological aging. This can lead to an earlier onset of conditions like cardiovascular diseases. (Kirkpatrick & Kennedy, 2018; Polcwiartek et al., 2024) Additionally, chronic inflammation associated with SSD is commonly linked to higher prevalence of physical illness (Lee et al., 2017).

2.1.2 Physical health of persons with SSD

Among people suffering from SSD, physical health is influenced by many different factors (Peritogiannis et al., 2022). Disease-related factors and a lack of awareness about preventive health behaviors often cause them to adopt unhealthy lifestyles (Heald et al., 2017; Kim et al., 2019; Šagud et al., 2019). Common issues include an unhealthy diet and low physical activity (Heald et al., 2017; van Zonneveld et al., 2022), as well as alcohol and substance use (Tumenta et al., 2020). Over 60% of people with SSD are reported to be smokers. This may be influenced by the dopaminergic activity of the brain and the reinforcing effects of nicotine. (Šagud et al., 2019) Unhealthy lifestyles combined with negative symptoms of SSD increase the risk of physical diseases by promoting obesity, aging and metabolic disorders (Annamalai & Tek, 2017; Peritogiannis et al., 2022). In addition to the impact of SSD and unhealthy lifestyles, health problems are largely due to the side effects of antipsychotic medication (Castle & Li, 2023; Peritogiannis et al., 2022). Side effects

can make it even more complicated to develop healthy habits (De Hert et al., 2011; van Zonneveld et al., 2022). Antipsychotic drugs, such as clozapine and olanzapine, are known to cause metabolic abnormalities. These abnormalities, such as glucose intolerance, elevated triglyceride levels, and significant weight gain, increase the risk of developing type 2 diabetes and cardiovascular disease. (Abo Alrob et al., 2019; Bressington et al., 2016a; Castle & Li, 2023; Larsen et al., 2018)

Due to these multi-faceted factors, a wide range of physical diseases have been reported among persons with SSD (Castle & Li, 2023). High prevalence of cardiovascular diseases (De Hert et al., 2018), metabolic syndrome (Eskelinen et al., 2015) and diabetes (Ward & Druss, 2015) have been reported. Persons with SSD have been found to suffer from obstructive sleep apnea (Castle & Li, 2023), hyperprolactinemia (Kelly et al., 2013), osteoporosis and low mineral density (Kishimoto et al., 2012). In addition, gastrointestinal problems such as dyspepsia and constipation (Virtanen et al., 2017), eye diseases (Liu et al., 2020) as well as movement and sexual dysfunctions (Marder et al., 2004) have been reported. Eskelinen (2017) reported that 44.9% of a sample of 275 patients with schizophrenia in Finland had somatic symptoms that affected their daily life.

Mainly as a result of physical comorbidities, persons with SSD experience premature mortality (Peritogiannis et al., 2022). Persons with SSD have significantly reduced life expectancy due to preventable health causes as well as external causes, including suicide (Bitter et a., 2017). Other external causes include accidents and fatalities associated with substance use disorders, which are prevalent comorbidities in SSD and further elevate mortality risk (Lähteenvuo et al., 2021). The life expectancy of people with SSD is approximately 15-25 years shorter comparing to the rest population (Goldstone, 2020; Hjorthøj et al., 2017; Laursen et al., 2014). Men with SSD have an estimated life expectancy that is 15.9 years shorter, and the corresponding figure for women is 13.6 years shorter compared to the main population (Hjorthøj et al., 2017). The most typical death causes are cardiovascular illnesses. Furthermore, premature mortality is mainly caused by other natural reasons that could be prevented, such as infections, pulmonary disorders, diabetes mellitus and cancers (Peritogiannis et al., 2022; Piotrowski et al., 2017). In Finland, long-term psychiatric patients die from natural reasons, just like the rest of the population. However, mortality among this group of patients is markedly higher than among the general population. (Räsänen et al., 2003) In addition, a study by Keinänen et al. (2018) found that Finns with non-affective psychotic disorders had more than a twofold increased risk of mortality compared to the general population, even after adjusting for smoking and physical health–related risk factors (hazard ratio [HR] ≈ 2.1).

Physical comorbidities cause not only premature mortality but also a financial burden on society (Schizophrenia. Current Care Guideline, 2024). Somatic

comorbidities are linked with an increased number of psychiatric rehospitalizations, independent of psychiatric comorbidities, lifestyle factors, or other clinical sociodemographic factors (Filipcic et al., 2017; Šprah et al., 2017). In Finland, schizophrenia alone causes healthcare costs of approximately 700–900 million euros annually, which mainly consist of institutional care (Schizophrenia. Current Care Guidelines, 2024).

2.2 Health services for persons with SSD

2.2.1 Mental health services for persons with SSD

Globally, mental health services for persons with SSD include multiple evidence-based methods (NICE, 2014). Services aim to address the complex health needs of persons with SSD. Mental health services consist of measures such as managing illness-related symptoms, improving functioning, quality of life and recovery, and addressing physical and social determinants of health (NICE, 2014). The key working methods in mental health services are pharmacotherapy, psychosocial interventions, and psychoeducation (Lehman et al., 2010). Services consist of guidance, counseling and appropriate psychosocial support, preventing mental health illnesses, as well as examination, care and medical rehabilitation (Lehman et al., 2010; NICE, 2014). However, several challenges occur in mental health services (Wainberg et al., 2017). Problems regarding the availability of services, as well as social stigma from professionals have been reported (Tristiana et al., 2018). Available service models have also been found to be fragmented and in addition, they suffer from a lack of resources. The reason why this policy seems difficult to change is allegedly the lack of capacity for research. Research on both implementation processes and the effectiveness of interventions is needed in order to provide knowledge on how interventions can best be carried out in different environments. (Wainberg et al., 2017)

In Finland, mental health services for persons with SSD are regulated by the Ministry of Social Affairs and Health (MSAH) (Finnish Institute for Health and Welfare, 2024a). MSAH is responsible for national planning, guidance and monitoring of mental health care (Ministry of Social Affairs and Health, 2024). The welfare service counties are responsible for providing mental health services for the treatment and rehabilitation of persons with SSD (Ministry of Social Affairs and Health, 2024). Mental health care is provided partly in public health care, partly in specialized nursing care. Specialist care units provide psychiatric services in outpatient and inpatient care in hospitals (Finnish Institute for Health and Welfare, 2024a). The Finnish Health Care Act applies to health care services (Health Care Act, 2010). The Mental Health Act is applied in situations where a person with SSD

must be treated against their will or other restrictive measures must be used in the treatment (Mental Health Act 1116/1990, 1990).

According to the Current Care Guideline for treatment of schizophrenia (Schizophrenia. Current Care Guideline, 2024), persons with SSD in Finland should primarily be treated as outpatients in a multiprofessional work group. Mental health services in clinical nursing are based on multiprofessional cooperation between different disciplines and professional groups. Multi-professional work groups in outpatient clinics mainly consist of clinicians, registered nurses and/or mental health nurses, and e.g. social workers, psychologists and occupational therapists. Cooperation is carried out with several different parties and service providers. In these service units, treatment is based on a treatment plan. An individual rehabilitation and treatment plan is made each time for each patient, and this plan will be revised at regular intervals. The treatment plan is drawn up by a psychiatrist and a multidisciplinary team in cooperation with the patient. Treatment should be planned according to the patient's individual needs but is oriented towards recovery. In addition to individual, regular appointments and group rehabilitation, housing services and other subsidized services can be offered to persons with SSD. The main forms of rehabilitation in outpatient care are often symptom management groups and other psychosocial activities. (Schizophrenia Current Care Guideline, 2024; Finnish Institute for Health and Welfare, 2024a) This study was conducted in psychiatric outpatient clinics.

2.2.2 Physical health services for persons with SSD

Physical health services for persons with SSD are globally provided mainly through collaboration between primary health care and mental health care (NICE, 2014). The aim of this integrated model is to address physical health issues alongside with mental health support. It aims to improve the well-being of these persons, being crucial in preventing physical health risks, detecting health issues, treating comorbidities and reducing the gap in life-expectancy between patients with SSD and the general population (Lehman et al., 2020; NICE, 2014).

Several international guidelines offer recommendations for evaluating the physical health of persons with SSD, emphasizing monitoring and health promotion. These guidelines are based on evidence of best practices for physical health monitoring, diagnosing and treating people with SSD (Lehman et al., 2010; NICE, 2014). The National Institute for Health and Care Excellence [NICE] guideline (2014) and American Psychiatric Association [APA] (Lehman et al., 2010) recommends assessment of cardiometabolic risk factors, e.g. weight, waist circumference, liver function, blood pressure, blood lipids, full blood count, and cardiac function. Lifestyles, such as smoking, physical activity, diet and sleep should

be assessed (Lehman et al., 2010; NICE 2014). The American Diabetes Association, American Psychiatric Association, American Association of Clinical Endocrinologists, & North American Association for the Study of Obesity (2004) emphasize the implementation of metabolic syndrome (Mets) screening to facilitate the prevention, early diagnosis and follow-up of Mets. In addition, the Maudsley Practice Guidelines for Physical Health Conditions in Psychiatry include recommendations for monitoring of urea and electrolytes, plasma glucose, prolactin and creatinine phosphokinase (Taylor et al. 2020). The purpose of screening is to detect health problems, predict future health problems and improve life expectancy (Castle & Li, 2023).

In the prevailing situation, physical health services for persons with SSD are globally insufficient. Several factors, such as systemic, structural and resource barriers undermine effective coordination of care, which leaves individuals without appropriate care. Physical health care is often reported to be fragmented and limited, which further worsens the health condition in persons with SSD (Firth et al., 2019). Diagnostic overshadowing is common (Hallyburton et al., 2022). Social stigma and difficulties accessing treatment significantly affect patient outcomes (Firth et al., 2019; Happell et al., 2012a). Social stigma and discrimination within healthcare settings can lead to negative attitudes, lack of support, and indifference from staff, further discouraging individuals with SSD from seeking help (Happell et al., 2012a; Harangozo et al., 2014; Polcwiartek et al., 2024). In addition, despite recommendations, screenings are poorly implemented (Ilyas et al., 2017; McGinty et al., 2015; Roberts et al., 2007). Evidence-based practices, such as screenings, can improve outcomes for people with SSD but are rarely followed in daily clinical settings (Bighelli et al., 2016). Lau et al. (2019) reported in the UK that physical health monitoring recommended in NICE guidelines was inadequately performed across all practices in a sample of 57 patients. Additionally, cancer screening rates in this population are consistently low (Grassi & Riba, 2020; Solmi et al., 2020).

In order to improve the situation and increase screenings, the role of nurses is emphasized in psychiatric settings (Blythe & White, 2012; NICE, 2014). Nurses are considered to have good chances of performing screenings and planning interventions in order to promote health in collaboration with patients (Gaughran et al., 2017). Nurses meet their patients regularly, have more contact and interaction with patients than other members of the multidisciplinary team, and are thus likely to be aware of the patient's overall health state (Roberts & Bailey, 2011). In addition, nurses in psychiatric settings have therapeutic communication skills that enable them to address sensitive topics and support patients' engagement in health-promoting discussions (Walker & Neal, 2014).

In Finland, the provision of physical health services for persons with SSD is based on the Current Care Guideline for schizophrenia (Schizophrenia. Current Care

Guideline, 2024). The welfare service counties are responsible for organizing and financing physical health services. Physical health care is provided by primary health care units in health care centres in collaboration with mental health service units (Ministry of Social Affairs and Health, 2024.) In Finland, the Current Care Guideline for schizophrenia (Schizophrenia. Current Care Guideline, 2024) follows international guidelines (Lehman et al., 2010; NICE, 2014). Physical health screenings should be integrated into clinical mental health practice in order to identify health risks in patients who lack sufficient capacity to report physical health problems or seek treatment. If physical illnesses or risk factors are detected, appropriate treatment should be carried out. A follow-up plan should be drawn up, preferably in collaboration with the primary care unit responsible for the treatment. (Schizophrenia. Current Care Guideline, 2024) Furthermore, measures have been taken to further improve physical health services for SSD patients. According to the National Mental Health Strategy 2020–2030 (Finnish Institute for Health and Welfare, 2024b), a development program will be launched to secure somatic health care and to promote the somatic health of persons with serious mental illness using the latest evidence-based methods. Service users' views must be considered in planning, implementation and evaluation of services. (Finnish Institute for Health and Welfare, 2024b) In addition, many health care organizations pursue Magnet hospital status, which creates a need to improve patient care and to engage nurses so that they would incorporate evidence-based practices into practice (Saunders & Vehviläinen-Julkunen, 2016).

2.3 Implementation of physical health screening in persons with SSD

2.3.1 Search strategy

A focused literature review was conducted, and the purpose was to explore existing research on the implementation of physical health screening for persons with schizophrenia spectrum disorders in mental health settings. A targeted review approach, as outlined by Huelin et. al. (2015), was applied to ensure depth and relevance while maintaining flexibility in source selection. This approach allowed for a comprehensive understanding of current knowledge related to the implementation of physical health screening in persons with SSD.

The search was performed in October 2024 across three databases: Pubmed (MEDLINE), CINAHL, and APA PsycInfo. Search terms included combinations of search terms ‘schizophrenia spectrum disorder’, ‘physical health’, ‘mental health care’, and as well their synonyms (see Appendix 1). The search strategy was developed in a collaboration with an information specialist. The database search

yielded a total of 187 records. In addition to database search, supplementary searches were conducted by reviewing the reference lists of included studies and by using the Google Scholar in order to identify additional relevant literature. Due to the limited number of studies on this topic, inclusion criteria were kept broad. Studies were included if they met the following criteria: 1) focused on adults with schizophrenia spectrum disorder (SSD); 2) were conducted in mental health settings; 3) addressed at least one of the following themes: physical health care, screening, or monitoring practices; validation or use of health screening tools developed for persons with SSD; nurses' or patients' perceptions of physical health screening or implementation processes or fidelity related to health screening practices. Both qualitative and quantitative studies were eligible for inclusion. No strict publication year limits were applied.

Screening and selection were undertaken by one researcher. The process included three stages: First, articles were initially screened based on titles. Second, the abstracts of these articles were reviewed based on their relevance. Third, full-text assessment of potentially eligible articles was conducted. The selection process was guided by relevance to the research aims rather than by rigid methodological criteria. Following the screening process, a total of 24 studies were included in the review. These studies are presented in Appendix 2. In the following chapters, the findings from the included studies are synthesized in order to identify key themes, highlight significant outcomes, and outline research gaps related to physical health screening of persons with SSD in mental health care.

2.3.2 Health screening tools for persons with SSD

Different tools have been used in health screening for persons with SSD. Often screening tools have been developed mainly to assess only individual health risks, such as metabolic syndrome (Wilson et al., 2014), lipids and HbA1c (a blood test that assesses the average value of glucose over the past 2-3 months) (Butler et al., 2020), physical activity (Faulkner et al., 2006), cardiovascular health (Yeomans et al., 2014) or colorectal cancer (Fujiwara et al., 2024). For example, the Let's Get Physical intervention was found to be cost effective in metabolic monitoring (Wilson et al., 2014). The Point of Care (POC) blood testing device was found beneficial and acceptable to patients, despite clinicians reporting barriers to implementation (Butler et al., 2020). The Short-Form International Physical Activity Questionnaire (IPAQ), originally developed for the general population, was validated among persons with SSD and found to be suitable for assessing physical activity. The reliability coefficient was 0.68 and the criterion validity coefficient 0.37. (Faulkner et al., 2006) Systematic cardiovascular screening proved useful for early detection of cardiovascular risks and increased risk recording (Yeomans et al., 2014).

Furthermore, colon cancer screening of patients with schizophrenia was found to be feasible for eligible patients, with the number of screened patients ranging from 33.3 to 100%, depending on the unit (Fujiwara et al., 2024).

Information can also be found on more comprehensive screening tools. These tools assess both health parameters typical of persons with SSD and health behavior risks. Among available tools, a program for individuals with severe mental illness, the Health Improvement Profile (HIP) has demonstrated excellent face validity and clinical utility during its development and testing (White et al., 2009). However, a subsequent study revealed feasibility challenges in its full implementation by nurses (White et al., 2018). Despite these challenges, HIP has shown promising outcomes in other studies. In Hong Kong, HIP was found efficient and had clinical utility. Using HIP led to significant improvements in levels of physical activity, reduced cardiovascular risks, decreased the number of diabetes medication prescriptions, and resulted in better health behavior in a one-year period. (Bressington et al., 2014) Similarly, initial implementation of the Chinese Health Improvement Profile (CHIP) presented subtle improvements in somatic health condition at the 12-month follow-up. Patients who were target for CHIP intervention felt more satisfied regarding their somatic health care in comparison to patients that received ordinary treatment ($P = 0.009$), and the community psychiatric nurses perceived the intervention as feasible. (Bressington et al., 2018a) In Thailand, the Thai version of HIP detected increased body mass index (BMI) results in almost half of the study participants in a sample of 105 patients (Thongsai et al., 2016). A randomized controlled trial conducted in Thailand revealed that the Thai version of HIP effectively prevented weight gain in patients with early psychosis (Meepring et al., 2023).

Another example of a physical health screening that included 8 general physical conditions and health risk parameters was found to be useful with 457 adults with serious mental illness (SMI). Compared to the rest population in U.S. states, higher prevalence of nicotine dependence, overweight, smoking, high blood pressure, diabetes, alcohol and drug abuse, and coronary artery disease were detected. Hyperlipidemia was screened for a lower proportion. In addition, screening detected 82 cases of undiagnosed hypertension, diabetes or hyperlipidemia. (Cook et al., 2015) In Finland, Eskelinen et al. (2015) found an examination comprising a questionnaire, an interview, a general clinical examination, measurements and laboratory tests to be feasible when trying to detect MetS. In a sample of 275 persons with schizophrenia, 58.7% had MetS, and using clozapine doubled the risk (Eskelinen et al., 2015). Examples of health screening tools are presented in Table 1.

Table 1. Examples of health screening tools.

Authors, year	Health screening tool	Content of the screening
Bressington et al., 2014; White et al., 2009; White et al., 2018	Health Improvement Profile (HIP)	27 health items
Bressington et al., 2018a	Chinese Health Improvement Profile (CHIP)	27 health items
Butler et al., 2020	Point of care (POC) blood testing	Lipid panel and HbA1c
Cook et al., 2015	Community Health Screening of Adults with Serious Mental Illnesses	8 general medical co-morbidities and health risk factors
Eskelinen et al., 2015	Comprehensive health examination	The examination included an interview, laboratory tests, a questionnaire, measurements and a clinical examination
Faulkner et al., 2006	Short-Form International Physical Activity Questionnaire (IPAQ)	An interviewer-administered IPAQ to recall activities for each of the last seven preceding days in the morning, afternoon, and evening time periods
Fujiwara et al., 2024	An implementation strategy on provider level in order to improve access to colorectal cancer screening	A colorectal cancer screening
Meepring et al. 2023; Thongsai et al., 2016	The Thai Health Improvement Profile	27 health items
Wilson et al., 2014	Let's Get Physical	Metabolic monitoring (weight, waist circumference, triglycerides, HDL cholesterol, fasting lipids, blood pressure, fasting plasma glucose)
Yeomans et al., 2024	A computer-based physical health screening template	A range of physical morbidity and health risks, including cardiovascular risk

2.3.3 Nurses' and patients' perceptions of physical health screening for persons with SSD

Nurses' and patients' perceptions of physical health screening for persons with SSD are available to some extent. To obtain knowledge, studies have used interviews (Butler et al., 2020; Happell et al., 2012b ; Happell et al., 2013; Mwebe, 2017; Voort et al., 2024) and surveys (Bressington et al., 2018b; Ganiah et al., 2017; Howard & Gamble, 2011; Knight et al., 2017; Robson et al., 2013; Yalçın et al., 2019).

Nurses have found to have a positive attitude towards physical health screening, as it is an integral part of their professional role (Knight et al., 2017; Voort et al., 2024; Yalçın et al., 2019). According to a few studies, positive attitudes have been associated with nurses' involvement in screenings (Bressington et al., 2018b; Ganiah

et al., 2017). Positive attitudes can clearly be seen especially towards weight control, blood pressure monitoring and cardiovascular health assessment (Ganiah et al., 2017; Howard & Gamble, 2011; Knight et al., 2017; Robson et al., 2013). However, nurses' attitudes have been less positive for cancer screening, eye and dental health and promoting sexual health (Ganiah et al., 2017; Robson et al., 2013). Furthermore, discrepancies in perceptions and clinical practice have been reported (Happell et al., 2012b; Happell et al., 2013). Despite nurses having found screening as a part of their role (Mwebe, 2017), they perceive their role as unclear (Happell et al., 2012b). Nurses think that they do not have the right to intervene in a person's somatic health problems. This is why health screening is offered more easily to those patients who are willing and cognitive enough to talk about health issues. (Happell et al., 2012b) Furthermore, nurses have perceived that providing physical health screening is a secondary concern, and their primary focus is to take care of mental health issues (Voort et al., 2024). Nurses have also felt that screening can be just another task of "form filling" (Happell et al., 2012b), causing frustration and an increased workload. Nurses have often experienced health screenings as "ad hoc" screenings that depend on the skills and attitude of the individual nurse, available resources and equipment, and the patient's state of mind (Mwebe, 2017; Voort et al., 2014). In addition, nurses have found that lifestyle goals are often set by professionals, but nevertheless, they are set at unrealistic levels (Voort et al., 2024).

Previous research has explored nurses' perceptions, confidence, and training needs in conducting physical health screenings for individuals with schizophrenia spectrum disorders (SSD). Nurses generally perceive physical health screenings for individuals with SSD as important (Mwebe, 2017; Yalçın et al., 2019). Their confidence in conducting these assessments is associated with their knowledge and experience in specific areas such as weight management, nutrition, cancer screening, diabetes, and sleep. Older and more experienced nurses tend to report greater confidence (Yalçın et al., 2019). While confidence is typically higher in measuring vital signs, assessing cardiac health, and recognizing medication side effects, it is often lower in areas such as reproductive health and testicular examinations (Mwebe, 2017; Yalçın et al., 2019). Varying levels of confidence and perceived training needs have also been reported in relation to dental, eye, and cancer screenings, as well as smoking cessation and sexual health promotion (Robson et al., 2013). Many nurses feel competent in practical tasks such as weighing patients, taking vitals, measuring urine, blood sugar, and blood pressure, and offering advice on nutrition and smoking cessation. While technical skills are generally relied upon, some nurses still lack confidence in using manual devices such as blood pressure monitors (Robson et al., 2013; Mwebe, 2017). Training needs are particularly emphasized in cardiovascular and diabetes care (Bressington et al., 2018b; Mwebe, 2017), whereas topics like

smoking cessation and reproductive health are less frequently identified as areas requiring further education (Robson et al., 2013).

Literature on patients' perceptions regarding physical health screening is scarce. Patients have reported that they experience anxiety before being screened, although they are feeling more secure after screening. Patients have agreed to participate in screenings because of curiosity, and because screenings were offered to them, and not because they considered it important, nor were they aware of the somatic health risks typical for SSD (Butler et al. 2020). However, patients have been willing to discuss specific concerns during screening, which have made the results more meaningful. Patients appreciate the opportunity to get answers to their health questions, which increases their understanding of their somatic health (Butler et al., 2020).

Some suggestions have been made to improve the implementation of physical health screening. Some nurses have proposed that a few nurses from the working group could specialize in physical health screenings. These trained nurses could provide screenings for patients, and improve training for colleagues (Mwebe, 2017; Voort et al., 2024). Realistic goal-setting and tailored support have been suggested in order to improve patient outcomes, especially for patients experiencing barriers like low self-esteem (Voort et al., 2024). Nurses have perceived that physical health care and screening should be integrated, and more collaboration is needed (Mwebe, 2017; Voort et al., 2024).

2.3.4 Implementation fidelity of health screenings in persons with SSD

Literature on the implementation fidelity of physical health screenings for persons with SSD is scarcely available. Implementation fidelity of metabolic screening has been reported to be low and inconsistent in persons with SSD (O'Brien & Abraham, 2021; Wilson et al., 2014). In a study in New Zealand, O'Brien & Abraham (2021) reported low rates of metabolic monitoring. Most frequently measured parameters were blood pressure and weight, with HDL cholesterol, triglycerides and HbA1c levels. However, waist circumference was seldom measured (O'Brien & Abraham, 2021). Wilson et al. (2014) reported in their study in Australia that metabolic screening was conducted for about two thirds of the patients, and only half of the patients were assessed for all parameters. Weight was measured for around half of the study participants, and blood glucose and lipids for only one in eight patients (Wilson et al., 2014). However, Fujiwara et al. (2024) reported in their study that implementation fidelity was high regarding colorectal cancer screening in patients with schizophrenia.

Some barriers for implementation of physical health screenings have been identified (Wilson et al., 2014). Even though barriers may be multiple and complex, time resources are constantly identified as the main barrier for holistic care, which also includes screening. A lack of training, protocols, tools and equipment were identified as a barrier for nurses to engage in physical health screening (Mwebe, 2017). Also, competence concerns, e.g. having the skills to calculate BMI value and manage obesity have been identified (Wilson et al., 2014). Lack of resources, such as staff turnover, lack of time and necessary equipment, and a "non-somatic" care culture are contributing factors that have been affecting screenings (Bressington et al., 2018b; Robson et al., 2013), and negative staff attitudes have also been reported (Mwebe, 2017). Nurses have reported a lack of feasible screening procedures and instruments in the health screening environment, as well as patient-related barriers, such as negative symptoms reducing their capacity to take initiatives, engagement, decision-making and empowerment (Robson et al., 2013). Moreover, gaps between policy and clinical practice, diagnostic overshadowing, organizational culture, attitudes and staff shortages have been reported as barriers for implementing screenings (Happell et al., 2012b; Robson et al., 2013; Voort et al., 2024).

Facilitators for implementing screening have also been reported. Role clarity, dedicated resources and ongoing education, better visibility in screening and a stronger connection to primary health care have been found to facilitate screening fidelity (Wilson et al., 2014). A provider-level implementation strategy, including an implementation team, interactive support using clear personal guidance and development of educational materials that are made available have been reported as facilitators for fidelity. Moreover, joint meetings, monitoring of progress and sharing information among participants are contributing factors that have facilitated implementation. (Fujiwara et al., 2024) Nurses have felt that the key to successful physical health screenings is to create a good relationship with the patients, which makes it easier to ask questions and to understand the patient's perceived problems and lifestyle related to physical health (Howard & Gamble, 2011).

2.3.5 The Health Improvement Profile (HIP)

The serious mental illness Health Improvement Profile (HIP) is a screening tool developed for assessing and promoting physical health among people with schizophrenia spectrum disorder (Shuel et al., 2010). The HIP is a structured clinical instrument which is being used to detect risks for physical illnesses in a comprehensive manner and to evaluate health behavior and subsequently to guide patients in choosing evidence-based actions for health promotion (White et al., 2009). The original HIP tool was created in the UK (Hardy et al., 2015; Shuel et al., 2010). HIP includes 27 items (28 in the version for female), consisting of physical

health items (e.g. glucose, waist circumference) and health behaviours (e.g. sleep, smoking). HIP-F screening is conducted in a collaborative discussion between nurse and patient. The assessment is two-fold; the results are first marked in the result column, e.g. smoker/non-smoker or the waist circumference measurement. Next, and also depending on cut-off points or international/national recommendations, the result is marked in the green column (healthy, no action required), or in the red column (unhealthy, action required). If the item is red-flagged, the HIP-F provides recommended actions in order to create a treatment plan for health promotion. According to the plan, the HIP screening should be conducted annually. HIP screening is described in a manual, providing more information regarding physical health issues related to SSD and regarding how to assess the health items. (Hardy et al., 2015; White et al., 2009) Detailed HIP items are presented in Table 1, in Paper II (Paper II).

HIP tool was chosen to be used in this study for several reasons. Firstly, no existing validated, structured physical health screening tool that comprehensively considers the health needs of SSD patients (Lehman et al., 2010; NICE, 2014) could be found in Finland, in the Finnish language. Secondly, HIP was found to be a potentially useful structured approach to screening. The HIP has been adapted and, where appropriate, translated for use in the US (Bos et al., 2018), UK (Hardy et al., 2015; Shuel et al., 2010), Australia (Brown et al., 2020), Thailand (Thongsai et al., 2016), Turkey (Çelik İnce et al., 2018; Çelik İnce & Partlak Günüşen 2021) and Hong Kong (Bressington et al., 2014) - demonstrating its applicability and usefulness in different international environments (Bos et al., 2022). Thirdly, the HIP was chosen as a health screening tool because of its nurse-centered approach, which is aligned with the principles of nursing science. Implementation of the HIP tool in collaboration with the patient enables the integration of broader aspects of mental health nursing practice, including psychoeducation, patient participation, therapeutic interaction, and health promotion. Thus, HIP was considered a suitable and contextually relevant screening tool for this study.

2.4 Summary of the literature and research gaps

First, health screening tools have mainly been developed in order to assess individual health risks only. Only a few structured, comprehensive physical health screening tools have been used to assess somatic health risks and unhealthy lifestyles in persons with SSD (Bressington et al., 2018a; Cook et al., 2015).

Second, nurses perceive screenings as important and have a positive attitude towards them (Voort et al., 2022) but mention that they feel uncertain and need training (Bressington et al., 2018b). Patients are happy to participate in screenings, even if they are not always aware of the purpose of the screening (Butler et al. 2020).

Third, implementation fidelity is low to physical health screenings in mental health settings (Wilson et al., 2014). Some barriers have thus been identified, such as staff turnover, lack of skills, knowledge, resources, time and necessary protocols and equipment (Bressington et al., 2018b; Howard & Gamble, 2011). In addition, patient-related barriers such as negative symptoms have been reported (Howard & Gample, 2011). In terms of successful physical health screening, a good relationship between nurse and patient has been considered as crucial (Howard & Gamble, 2011).

Research gaps were found as follows:

- No research has been published on the validation of any Finnish-language health screening tool intended to assess the physical health of patients with schizophrenia spectrum disorder, as well as the evaluation of its content validity and clinical utility.
- There is no published research reporting on the detailed experiences of nurses and patients diagnosed with SSD on the use of health screening tools, and how these tools could be improved or more effectively implemented.
- There are no published studies on the implementation fidelity of a comprehensive physical health screening of SSD patients in a mental health setting, and the associated factors as described by nurses.

3 Theoretical approach of the study

The theoretical approach in this study is based on the five-level nested hierarchical socio-ecological model (SEM) (Richard et al., 1996; Sallis et al., 2015). The socio-ecological model is a framework for understanding the multilevel social system and the interactions between individuals and the environment (Richard et al., 1996). According to the socio-ecological model, health is influenced by the interaction between individual, community, and environmental characteristics that include physical, social, and political components (Sallis et al., 2015). The socio-ecological model consists of five nested, hierarchical levels: Individual, interpersonal, organizational, community and policy/enabling environment (Figure 1).

The socio-ecological model was chosen to get a better understanding of this important issue through highlighting several different levels that are associated with the implementation of screening. The SEM was a suitable framework for the study because it allows for a multidimensional examination of HIP-F screening and implementation, from the individual to the system and societal levels. First, on an individual level, SEM provides a theoretical framework that helps us to understand how personal factors, such as reduced insight into illness, difficulties in cognitive function and low initiative to seek physical health screenings (NICE, 2014), can determine whether individuals with SSD are likely to engage in physical health screenings. Second, at the interpersonal level, the SEM provides a framework that helps us understand how the relationship and communication between nurses and persons with SSD can influence the implementation of physical health screenings, such as HIP-F. Third, at the organizational level, the SEM highlights how organizational factors, such as the lack of integration between physical and mental health services, insufficient staffing, limited training, and inadequate protocols, can hinder the implementation of physical health screenings for individuals with SSD (Firth et al., 2019). Fourth, at the societal level, the SEM draws attention to how broader systemic factors, e.g. regional health care practices, resource allocation, and public health priorities influence the availability and implementation of physical health screenings for individuals with SSD. Fifth, at the policy level, the SEM provides a framework for examining how legislation, national guidelines, and health care policies shape the implementation of physical health screenings within clinical

mental health settings for individuals with SSD. Therefore, this theory-based framework makes it possible to understand the diverse and interactive effects of personal and environmental factors that determine behavior (Richard et al., 1996). The model also supports a mixed methods research approach that combines quantitative and qualitative data from the perspectives of different actors such as patients, nurses and organizations.

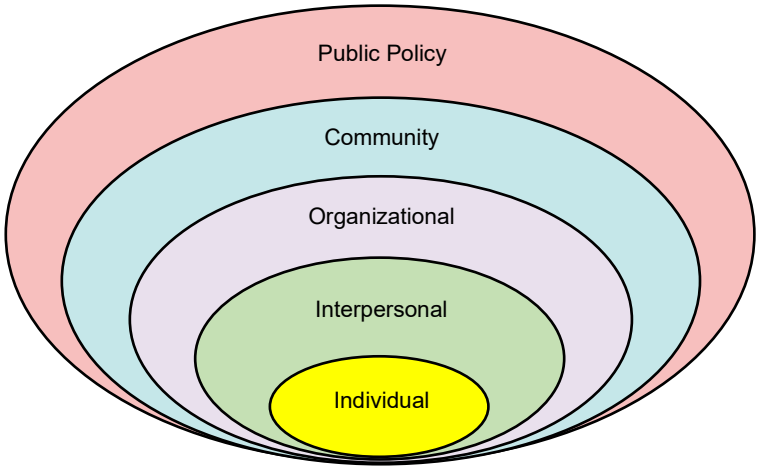

Figure 1. The Socio-ecological Model. Adapted from McLeroy et al. (1988).

In this study, the social-ecological model and its different levels were applied as follows: At the core of the study were the **individuals**, diagnosed with SSD, a vulnerable patient group with elevated risk of physical health problems. The focus of the study was how physical health screenings with HIP-F tool were being implemented, based on individual health needs in this population. For reasons related to comprehensiveness and providing an understandable framework, face and content validity as well as clinical utility were explored.

The **interpersonal** dimension of this study was the interaction between nurses and patients, and their collaboration in conducting screening. Nurses' and patients' perceptions were explored in order to understand how such perceptions influenced the usability and acceptability of the tool. Perceptions also provided valuable insights on how to improve the screening practice.

Outpatient clinics presented the **organizational** context of this study. These settings were discussed based on the results that showed whether the organizations had the necessary capacity to support the implementation of physical health screening. This was identified in nurses' perceptions relating to barriers or facilitators for implementation fidelity.

The **community** level encompassed the community psychiatric services that played a crucial role in the treatment of persons with SSD. Efforts to integrate HIP-F as a screening method into community-based services were explored. Such efforts should be seen as an attempt to answer these challenges and strengthen support systems for persons with SSD.

On the **public policy** level, this study emphasized the significance of systemic support for implementing physical health screening practices. Such policy initiatives are considered crucial for ensuring successful improvements in health outcomes.

These levels were discussed in the integrated results of Phases I-III in the discussion section and when formulating the conclusions of this study.

4 Aims

The overall aim of the study was to examine the implementation of physical health screening for persons with SSD using the Finnish Health Improvement Profile (HIP-F) tool. The study described the face and content validity, clinical utility, nurses' and patients' perceptions, implementation fidelity, and related factors of the HIP-F tool in a Finnish clinical mental health setting. The sub-aims were as follows:

Phase I. Validation of the HIP-F tool

1. To translate the HIP-F tool into Finnish and assess its face and content validity (Paper I).
2. To assess the potential clinical utility of the HIP-F tool (Paper I).

Phase II. Exploration of nurses' and patients' perceptions of the HIP-F tool

1. To explore nurses' and patients' perceptions of using the HIP-F tool (Paper II).
2. To identify areas for improvement in implementing physical health screening among persons with SSD, based on nurses' and patients' feedback (Paper II).

Phase III. Assessment of nurses' implementation fidelity of the HIP-F tool

1. To assess nurses' implementation fidelity in using the HIP-F tool (Paper III).
2. To identify factors related to nurses' implementation fidelity (Paper III).

A summary of the study phases and sub-aims is presented in Figure 2.

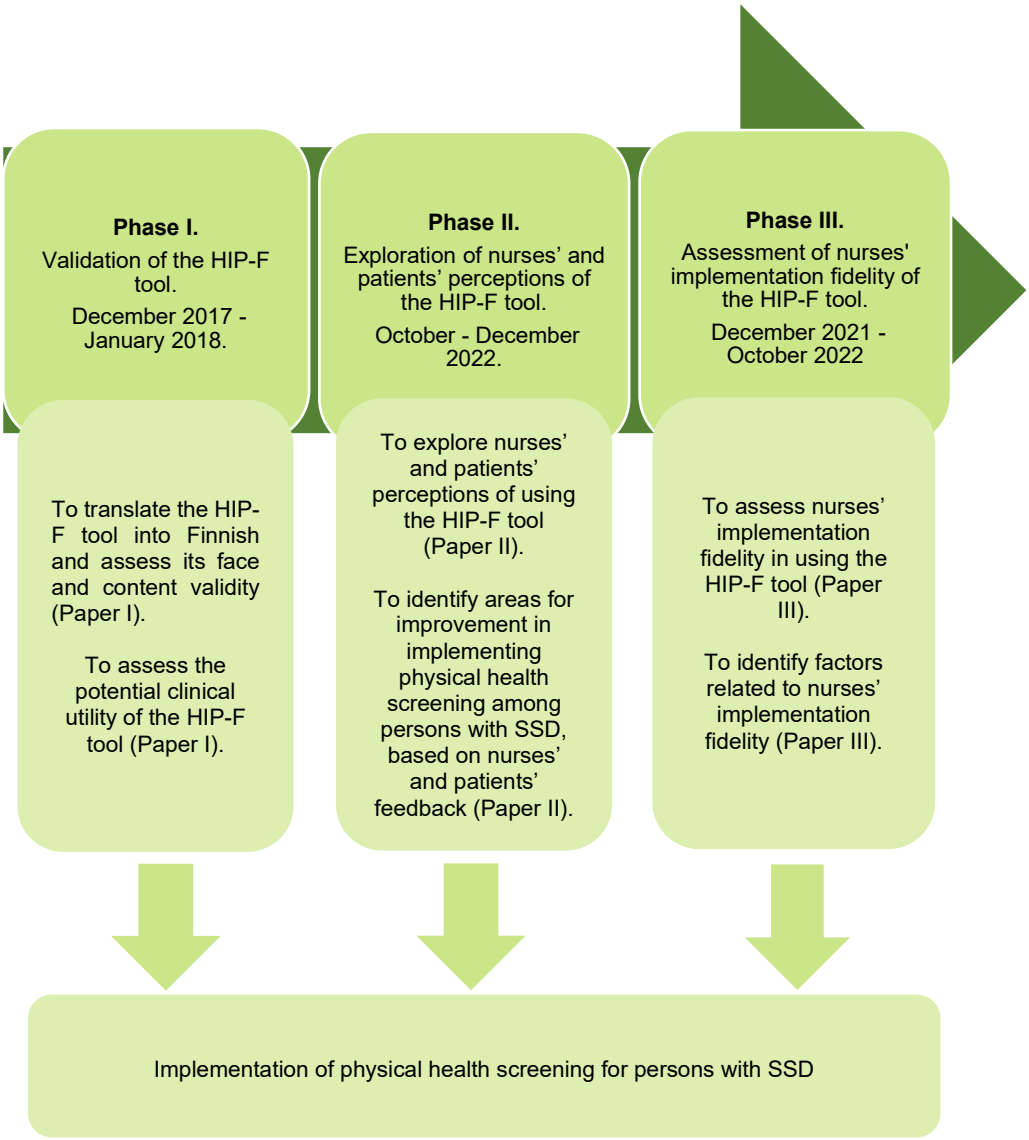

Figure 2. Summary of the study phases.

5 Materials and methods

5.1 Methodological approach of the study

This study was conducted based on a pragmatic approach that emphasizes practical solutions, combining different research methods in order to get answers to a complex phenomenon (Long et al., 2018). According to pragmatism, the effectiveness of research is not only based on statistical connections, but also on human and contextual factors. When assessing the physical health of an individual with SSD, it is crucial to acknowledge the patient's holistic and social background, as such factors affect her/his health. A pragmatic approach can also be used to examine the practical implications of research, for example by applying mixed methods to explore health care practices and their influence on physical health screenings (Creswell & Plano Clark, 2017).

This study applied an explanatory sequential mixed methods design (Creswell & Plano Clark, 2017) so that the qualitative inquiry could focus on areas of interest highlighted by the quantitative results. This mixed methods study combined qualitative and quantitative approaches in order to gain a more comprehensive understanding of the use of physical health screening for persons with schizophrenia spectrum disorder (Creswell & Plano Clark, 2017; Ivankova et al., 2006). A mixed methods approach was chosen due to its demonstrated utility in nursing practice research (Fawcett, 2015) and its relevance in mental health research, since it supports the exploration of complex and sensitive issues from multiple perspectives (Bowers, 2013; Kettles et al., 2011). By applying a qualitative as well as a quantitative approach, we aimed for a deeper and more comprehensive understanding of the phenomenon, which could not have been achieved if only one of those two approaches had been used (Creswell & Plano Clark, 2017). In this study, different study designs, data sources, data procedures, data collection, and analysis methods were used to achieve a more complete understanding of the studied phenomenon (Wasti et al., 2022). The findings from Phases I-III were integrated and interpreted using a contiguous approach. The results were combined and presented as a single, cohesive report in the discussion section of the study (Fetters et al. 2013; Greene et al., 1989; Guetterman et al., 2015; Ivankova et al., 2006).

Methodological approaches and methods were used in Phases I-III as follows:

In **Phase I**, a quantitative methodological approach was chosen in order to assess the validity and clinical utility of the HIP-F tool, as well as to provide data of detected health risks and their prevalence in the study population (Chen et al., 2014). Based on this methodological approach, a validated process was followed with the purpose of guiding the linguistic translation of the tool applied and ensuring its clinical applicability. Quantitative methods were used in order to generate statistical data, allowing for appropriate statistical analysis (Edmonds & Kennedy, 2016). (Paper I)

Firstly, the six steps out of a seven-step guideline for translation, adaptation and cross-cultural validation of research instruments were applied (Sousa and Rojjanasrirat, 2011). Steps 1-4 were used for translation. The translation process is described in detail in Paper I. In step 5, cognitive debriefing (Willis, 2004) was used to assess the face and content validity (Barr & Elwyn, 2016; Yaghmaie, 2003) of the HIP-F tool through using expert panels of nurses and patients with SSD. Finally, in step 6, a pilot study was conducted to assess the potential clinical utility of the HIP-F tool in assessing physical health in SSD patients (Sousa & Rojjanasrirat, 2011). (Paper I)

In **Phase II**, a qualitative methodological approach was chosen aiming to create a comfortable and flexible environment that would facilitate open dialogue and expression of opinions (Stebbins, 2001), and to gain deeper insight into participants' attitudes, beliefs and values (Sale et al., 2002). This approach enabled a richer understanding of participants' perceptions of the physical health screening using the HIP-F tool (Patton, 2002; Sandelowski, 2000). As a qualitative method, both focus group and individual interviews were conducted to explore participants' perceptions in depth and to provide data for an inductive content analysis (Patton, 2002; Sandelowski, 2000). Open-ended questions were used in both interview formats with the purpose of identifying the phenomenon studied and as well as allowing participants to freely express their perceptions (Patton, 2002; Sandelowski, 2000). In reporting the study findings, the Consolidated Criteria for Qualitative Studies were applied (COREQ) (Tong et al., 2007). (Paper II)

In **Phase III**, qualitative as well as quantitative methodological approaches were applied using a mixed-methods design in order to address the research aims (Ivankova et al., 2006). This approach enabled the integration of qualitative explanations with quantitative findings, which is recommended for assessing the implementation fidelity (Bellg et al., 2004). A mixed methods approach was employed throughout all stages in Phase III, including for design, application of methods and interpretation and reporting the results (Fetters et al. 2013). (Paper III)

First, a sequential approach was used in study design. Quantitative data were collected using the HIP-F tool, followed by qualitative data collection through focus group interviews for nurses. The quantitative and qualitative data were collected and

analyzed separately, with the qualitative phase conducted after the quantitative phase (Creswell & Creswell, 2017; Ivankova et al., 2006). Second, a merging approach was applied with the purpose of integrating data collected from different sources (Fetters et al., 2013). Third, a contiguous approach was used when interpreting and reporting the results, and subsequently the findings were integrated into a single report in the discussion section (Fetters et al. 2013; Greene et al., 1989; Guetterman et al., 2015; Ivankova et al., 2006). A more detailed integration of results is presented in Paper III. (Paper III)

The Conceptual Framework for Implementation Fidelity (CFIF) (Carroll et al., 2007) was used. According to Carroll et al. (2007), implementation fidelity is understood as being based on two components: adherence and moderating factors. First, adherence is understood as a measure defining whether the intervention was implemented as planned, including quantifiable sub-categories: content, coverage, frequency, and duration. Second, moderating factors (participant responsiveness, comprehensiveness of policy description, facilitation strategies and quality of delivery) can influence the adherence positively or negatively. (Carroll et al., 2007) For reporting the results, we adapted the Good Reporting of a Mixed Methods Study (GRAMMS) guideline (O'Cathain, et al. 2008). (Paper III)

5.2 Study design

In Phase I, a descriptive quantitative survey design was used to elicit information from study participants for assessing the face and content validity as well as the clinical utility of the Finnish Health Improvement Profile (HIP-F) tool (Grove et al., 2013). This design is particularly suitable for systematically collecting standardized data to support instrument validation. (Paper I)

In Phase II, a qualitative exploratory study design was used (Patton, 2002; Sandelowski, 2000). This design enabled the exploration of nurses' and patients' perceptions of using the HIP-F tool, as well as their suggestions for improving its implementation, since this topic has not previously been studied in the Finnish mental health care context (Hunter et al., 2019; Sandelowski, 2000). (Paper II)

In **Phase III**, an explanatory, sequential two-phase mixed methods design was used to pursue the research aims (Creswell & Creswell, 2017; Ivankova et al., 2006). This study design was chosen to achieve a deeper understanding of implementation fidelity from two angles: The quantitative method was used to assess nurses' implementation fidelity in using the HIP-F tool for patients with schizophrenia spectrum disorders. The qualitative method was used to describe factors moderating implementation fidelity (Carroll et al., 2007). (Paper III)

A summary of methods used, study designs and data sources are presented in Table 2.

Table 2. Summary of used methods, study designs and data sources.

Phase	Methods	Study design	Data sources
Phase I (Paper I)	Quantitative	A descriptive quantitative survey design	Survey
Phase II (Paper II)	Qualitative	A qualitative exploratory study design	Focus groups Individual interviews
Phase III (Paper III)	Quantitative Qualitative	An explanatory sequential two-phase mixed methods design	Survey Focus groups

5.3 Setting

In **Phase I**, the study setting consisted of three specialized psychiatric outpatient clinics in one university hospital. Two outpatient clinics were used for cognitive debriefing and one for pilot testing. (Paper I)

In **Phase II** and **Phase III**, five specialized psychiatric outpatient clinics in one university hospital formed the study clinics. Three of these clinics were the same clinics as in Phase I. (Papers II and III)

All of these outpatient clinics represented the study population, being part of a large hospital area. In these clinics, the outpatient care unit offers multiprofessional mental health services to those patients whose SSD symptoms do not require acute hospital treatment and who are able to manage their SSD disorder daily (Ministry of Social Affairs and Health, 2024). During the study, a total of approximately 2,300 adult patients diagnosed with schizophrenia or other psychotic conditions (WHO, 2024) were treated annually in the clinics. In this study, these clinics were chosen because of the representativeness of the study participants. Nurses work in outpatient clinics and meet patients with SSD regularly. Patients meet regularly with a nurse at outpatient clinics, depending on their individual treatment and rehabilitation plan and their individual needs. The duration of such meetings is approximately 45 minutes. The role of the nurses working in these outpatient clinics are crucial, as patients are able to have regular scheduled meetings with a familiar nurse in the clinic, and thus, conditions were considered to be ideal for conducting physical health screenings (NICE, 2014).

5.4 Study populations, recruitment and sampling

The study population consisted of both nurses (Papers I- III) and patients (Papers I and II).

The study population of nurses consisted of mental health nurses and registered nurses working in outpatient clinics as part of a multidisciplinary team. These nurses

meet patients with schizophrenia spectrum disorders (SSD) independently and on a regular basis. They were selected due to their central role in providing comprehensive outpatient care that addresses both physical and mental health needs. Due to their frequent contact with patients and central role in routine care, nurses were considered well suited to implement the HIP-F tool in clinical practice, evaluate its usability and clinical relevance, provide feedback to improve physical health screening, and serve as key informants in assessing the fidelity of its implementation. In addition, nurses were chosen to represent diverse perspectives based on differences in age, gender, education, and work experience. With the purpose of recruiting nurses, the researcher arranged information sessions via Teams for outpatient clinics, gave oral and written information about the study and invited nurses to participate in the study. (Papers I-III)

The patient population in this study consisted of persons diagnosed with SSD who had treatment contact and regular meetings with nurses in outpatient clinics. These patients were invited to participate because they represented the target group for the study and because involving patients in research related to their treatment and interventions is recommended (Lander et al., 2019). Patients were included to provide valuable perspectives on the face and content validity of the HIP-F tool, contribute to the evaluation of its clinical utility as a physical health screening tool, and share their experiences and perceptions as its intended end users (Schilling et al., 2007). In order to recruit patients, nurses were asked to provide written and verbal information about the study to eligible patients at their clinics during scheduled appointments and to invite patients to participate in the study. As SSD can be associated with cognitive deficits (Gold & Harvey, 1993; NICE, 2014), we aimed to ensure that each nurse had the skills to assess their patients' cognitive abilities and determine whether patients were able to give their informed consent to the study. (Papers I and II)

Different sampling methods were used in Phases I-III as follows:

In **Phase I**, a total population sampling method was used to collect data from a small, representative group of nurses in an expert panel for cognitive debriefing (Grove et al., 2013). A purposive sampling method (Grove et al., 2013) was used in recruiting patients to participate in an expert panel for cognitive debriefing (Grove et al., 2013; Hennink et al. 2019). A convenience sampling method (Grove et al. 2013) was used to increase the representativeness of the patient sample and the generalizability of the research results in the pilot testing phase of the HIP-F. (Paper I)

In **Phase II**, a purposive sampling method was used both for nurses and patients to ensure the data were collected from study participants who had experience of conducting or being a target for physical health screening with HIP-F (Grove et al., 2013; Hennink et al. 2019). (Paper II)

In **Phase III**, a purposive sampling method was used to generate comprehensive information concerning the studied phenomenon (Grove et al., 2013; Hennink et al., 2019) from selected nurses with diverse backgrounds and relevant information

relating to factors that moderate nurses' adherence and implementation fidelity (Côté & Turgeon, 2005). (Paper III)

The populations, sampling methods, inclusion criteria and samples of the phases are described in Table 3.

Table 3. Summary of populations, samplings, inclusion criteria and samples in three phases.

Phase and sub-aims	Population	Sampling methods	Inclusion criteria	Sample
Phase I Assessment of content validity	Nurses	Total sampling (Cognitive debriefing)	Professional education (registered nurse, mental health nurse). Permanently employed worker or long-term temporary worker. Providing treatment for patients in clinical practice.	n=5
	Patients	Purposive sampling (Cognitive debriefing)	Minimum age of 18 years. Able to read and speak Finnish. Able and willing to give written informed consent.	n=4
Assessment of potential clinical utility.	Patients	Convenience sampling (Pilot test)	Minimum age of 18 years. Able to read and speak Finnish. Able and willing to give written informed consent.	n=47
Phase II Exploration of nurses' and patients' perceptions of using the HIP-F screening tool and identification of areas for improvement in its implementation based on their feedback.	Nurses	Purposive sampling	Professional nursing qualification (mental health nurse, registered nurse). Being a permanent employer or a long-term temporary worker. Working at the clinical practice as a patient's primary nurse.	n=15
	Patients	Purposive sampling	Minimum age of 18 years. Being treated in outpatient clinics. Able to understand and speak Finnish. A diagnosis of schizophrenia spectrum disorder. Being previously targeted for physical health screening.	n=8
Phase III Assessment of nurses' implementation fidelity in using the HIP-F screening tool for persons with SSD and identification of related factors.	Nurses	Purposive sampling	Professional nursing qualification (mental health nurse, registered nurse). Being a permanent employer or a long-term temporary worker. Working at the clinical practice as a patient's primary nurse.	n=15

5.5 Data collection procedures

In **Phase I**, the cognitive debriefing process first began with the use of a self-developed data extraction tool in order to evaluate the face and content validity of the translated Finnish Health Improvement Profile (HIP-F) tool. Content validity was assessed using both the item-level content validity index (I-CVI) and the scale-level content validity index (S-CVI), following established guidelines (Polit & Beck, 2006). To quantify clarity and relevance, a 4-point Likert scale was employed, where 1 = not clear/relevant, 2 = moderately clear/relevant, 3 = very clear/relevant, and 4 = extremely clear/relevant (Lynn, 1986; Polit & Beck, 2006). For face validity, participants were invited to provide comments and suggestions in order to enhance the clarity of words and meanings in the instrument. The data were collected between December 2017 and January 2018. Consented patients answered the questionnaire independently in paper form after scheduled meetings with the nurses in the clinics. Nurses filled in the electronic data extraction tool, sent to their email. (Paper I)

Second, in order to evaluate the clinical utility of the translated HIP-F tool, the HIP-F form was used in a pilot test. Data were collected between February and April 2018. Nurses evaluated the physical health and health behaviours of patients using the HIP-F tool during their scheduled meetings in the outpatient clinics. The outpatient clinics were provided with thermometers and measuring tapes. In addition, nurses extracted patients' glucose and cholesterol values, pulse and blood pressure from medical records. The demographic and clinical characteristics of the patients were recorded as follows: age, gender, height and weight. (Paper I)

In **Phase II**, the interview questions were created based on the process observation method which had been used in a UK-based cluster-randomized controlled trial with HIP (White et al., 2018) and a qualitative descriptive study on HIP conducted in Hong Kong (Bressington et al., 2016b). The open-ended questions were designed to explore participants' perceptions of using the HIP-F tool and to identify areas for improvement in its implementation. The questions addressed experiences of physical health screening with the HIP-F, general views on physical health screening, the most and least feasible items, the duration of the screening, and suggestions for improvement. The data were collected between October and December 2022. For nurses, altogether four group interviews were conducted, with two to six participants in each interview, and one nurse was individually interviewed. Eight patients were interviewed individually. The duration of the interviews with nurses varied from 25 to 56 minutes and the patients' interviews lasted from 8 to 32 min. (Paper II)

In **Phase III**, the quantitative and qualitative data were collected sequentially. First, the quantitative data were collected with Finnish Health Improvement Profile (HIP-F). Nurses were asked to conduct physical health screenings during their scheduled patient appointments by completing the HIP-F tool. This included

assessing all measurable health items and retrieving relevant laboratory results from the patient record system. To support the screenings, clinics were provided with thermometers and measuring tapes. Nurses documented the screening results for consented patients using the HIP-F form. The data were collected between December 2021 and October 2022. (Paper III)

Second, qualitative data were collected through focus group interviews with nurses in order to gain insights into factors influencing the implementation of physical health screenings using the HIP-F tool (Côté & Turgeon, 2005; Persch & Page, 2013). Two semi-structured questions were used to guide the discussions, including prompts about the factors that influenced whether or not nurses conducted physical health screening using the HIP-F tool. Data collection took place between October and December 2022. The duration of the interviews with nurses ranged from 25 to 56 minutes. (Paper III)

5.6 Data analysis

In **Phase I,** there was a first stage with cognitive debriefing, where a quantitative evaluation analysis method was used in order to analyze the content validity of the HIP-F through three approaches. Firstly, the Item Content Validity Index (I-CVI) was calculated to evaluate the clarity and relevance of each item and its recommended actions. Secondly, congruence was determined by dividing the number of experts that had rated an item as "3 = very clear/relevant" or "4 = extremely clear/relevant" by the total number of experts. Thirdly, the Scale-Level Content Validity Index (S-CVI) was computed by identifying the number of items in the HIP-F that received a rating of "3 = very clear/relevant" or "4 = extremely clear/relevant." The 4-point Likert scale was simplified into a three-dimensional scale, where ratings of 1 and 2 were categorized as invalid, and ratings of 3 and 4 as valid (Lynn, 1986; Polit & Beck, 2006). The average value of the I-CVI (S-CVI/Ave) was then calculated by summing all the I-CVI values and dividing by the total number of items. The Total Scale Content Validity Index (S-CVI) was analyzed by calculating the S-CVI/Ave values. These were compared against the commonly accepted threshold of 0.78, based on evaluations by six or more expert panel members (Lynn, 1986; Polit & Beck, 2006). (Paper I)

In the second stage, a pilot test was arranged, where statistical analyses were conducted (Grove et al., 2013). The participant characteristics and the clinical utility of the HIP-F for identifying the prevalence of red-flagged items were described using mean, median (Md), and interquartile range (IQR), and standard deviation (SD) (Bressington et al., 2018a; Thongsai et al., 2016). Differences in the frequencies of red-flagged items between genders were analyzed using a chi-square test, with a two-sided significance level set at $p \leq 0.05$ for all tests (Grove et al., 2013). Missing items

in the completed HIP-F forms were examined by analyzing the frequencies of single missing item responses and partially missing item responses (Garcia-Campayo et al., 2010; Tennant et al., 2007). All statistical analyses were performed using the IBM SPSS Statistics version 24 for Windows (Abu-Bader, 2021). (Paper I)

In **Phase II**, an inductive content analysis approach was used due to the absence of prior qualitative studies on the topic (Elo & Kyngäs, 2008) and because of the complex, sensitive, and multifaceted nature of the nursing phenomenon being studied (Elo & Kyngäs, 2008; Vaismoradi et al., 2013). Data from individual interviews and focus groups were combined to generate complementary insights and provide a deeper and thorough understanding of the phenomenon (Lambert & Loiselle, 2008). All interviews were transcribed using Word 2021 and analyzed using the five-step method outlined by Graneheim and Lundman (2004). (Paper II)

In **Phase III**, quantitative and qualitative methods were used for data analysis.

First, frequencies, percentages, means, and standard deviations (SD) were used to describe participant characteristics. All analyses were performed using the IBM SPSS Statistics version 24 for Windows (Abu-Bader, 2021). For adherence analysis purposes, frequencies and percentages were calculated to determine item-level adherence during content assessment. Mean item adherence was derived by calculating the item-level and item-area adherence (Borrelli et al., 2005). Based on the mean item as well as mean item area adherence values, implementation fidelity was categorized as high, moderate, or low (Garbacz et al., 2014; Perepletchikova et al., 2005). (Paper III)

Second, a framework-driven deductive content analysis was conducted to analyze the audio-recorded interviews, guided by the Conceptual Framework for Implementation Fidelity (CFIF) (Carroll et al., 2007). This approach was selected because the analysis was based on prior knowledge of implementation fidelity (Elo & Kyngäs, 2008). In accordance with a system proposed by Graneheim and Lundman (2004), the deductive content analysis process was conducted in three stages, by preparing, organizing and reporting. (Paper III)

After the separate analyses of quantitative and qualitative data, data integration was undertaken during the interpretation phase in order to develop a comprehensive understanding of the study outcomes (Greene et al., 1989; Guetterman et al., 2015; Ivankova et al., 2006). Data integration combined quantitative and qualitative findings, highlighting similarities and differences by merging results and discussing the integrated outcomes (Guetterman et al., 2015). (Paper III)

Finally, following a mixed methods approach, the results from phases I-III were integrated into the discussion section of the summary. The quantitative data brought generalizability to the results, while the qualitative data provided depth about the studied phenomenon. A merging approach was adopted while the results were collected from different data sources in Phases I-III (Fetters et al., 2013). When

interpreting and reporting the results of this study, a contiguous approach was used for integration purposes, and the results of all phases were presented in the discussion part of the study as one single cohesive report (Fetters et al. 2013; Greene et al., 1989; Guetterman et al., 2015; Ivankova et al., 2006). The integration process was explicit and sequential: quantitative data were collected first, followed by qualitative interviews, which helped to interpret and contextualize the quantitative findings.

A summary of the data collection procedures and analyses is presented in Table 4.

Table 4. Summary of data collection procedures and analyses.

Phase	Instrument	Data collection	Analysis
Phase I	A self-developed data extraction tool with a Likert scale	Self-reported questionnaire	Quantitative evaluation
	The Finnish Health Improvement Profile (HIP-F)	Self-reported questionnaire	Descriptive statistical analysis Cross-tabulation, a chi-square test
Phase II	Interview questions	Focus groups Individual interviews	Inductive content analysis
Phase III	The Finnish health Improvement Profile (HIP-F)	Self-reported questionnaire	Descriptive statistical analysis
	Interview questions	Focus groups and individual interviews	Deductive content analysis, data integration

5.7 Ethical considerations

This study was conducted in accordance with ethical principles, including respecting autonomy, protecting privacy, avoiding harm, and ensuring data protection. All study phases were conducted according to the Declaration of Helsinki (World Medical Association, 2001). In all study phases, oral and written information were provided to study participants regarding the study before they gave their signed informed consent to participate (The Finnish National Board on Research Integrity [TENK], 2019). Information documents included precise information regarding the study aims, participants' rights, confidentiality and voluntary participation. These documents stated that participating in the study is voluntary. Regardless of whether the patient chose to participate, expressed refusal to participate or withdrew their consent to participate in the study, the documents stated that this would not influence their treatment. In addition, documents presented information about possible

inconveniences for study participants (i.e. the time spent on the study), but also possible benefits, such as information that the patients would receive relating to their physical health status immediately after health screening. During all study phases, confidentiality was ensured by removing any personal data from all research data (Data Protection Act 1050/2018, 2018; The Finnish National Board on Research Integrity (TENK), 2019). (Paper I-III)

A key ethical aspect of this study was the vulnerability of the patients. Persons diagnosed with schizophrenia spectrum disorder are generally vulnerable. Since persons with SSD may have cognitive deficits (NICE, 2014; WHO, 2024), nurses in outpatient clinics ensured patients' ethical and medical capability to give their consent to participate. It was envisaged that the study would not interfere with routine outpatient care (Gold & Harvey, 1993; Finnish National Board on Research Integrity (TENK), 2019). We also considered that some items in the physical health screening might be sensitive to talk about (Thongsai et al., 2016) and could possibly cause anxiety in patients. Therefore, we aimed to ensure that the nurses in the outpatient clinics were experienced and confident in talking about sensitive topics such as self-harm, suicide and sexual abuse, and had the knowledge to deal with patients' anxiety (Webster et al., 2012). In addition, patient study participants were interviewed individually in order to ensure privacy and confidentiality, considering the patients' possible suspicion because of the underlying disease (NICE, 2014; WHO, 2024). The study did not involve participant validation, meaning that interviewees did not check their own transcripts. This decision was made for ethical and practical reasons in order to avoid a potential added burden to the participants (Carlson, 2010) (Paper I- III).

Permission to validate and use the original Health Improvement Profile (HIP) tool (Hardy et al., 2015; White et al., 2009) was obtained from the developers of the HIP. The study proposal and information documents were evaluated by the Ethical Committee of the hospital district for **Phase I** (HUH/1276/2017) and as well for **Phases II-III (**HUH/1556/2021). The permission to conduct the study was obtained from the study organization (Paper I-III).

Data management in this study followed the established ethical and legal principles. Our study complied with the EU General Data Protection Regulation (GDPR) (European Union, 2016), relevant Finnish legislation, the guidelines of the Finnish National Board on Research Integrity (TENK, 2019), the Declaration of Helsinki (World Medical Association, 2001), and the Council for International Organizations of Medical Sciences (2016). All research data, both paper-based and electronic, were stored securely in locked facilities or on password-protected computers. Access to the data was restricted to the researcher only. During the study, electronic data were backed up on a secure, closed platform maintained by the research organization. No data were transferred outside the EU/EEA. All data

collection, processing, and reporting were conducted with a view of protecting participant confidentiality and preventing identification. The most critical aspect of privacy protection was to ensure the secure handling of data during collection, analysis, and publication. Qualitative interviews were audio-recorded, transcribed, and anonymized. Quantitative data were stored electronically for statistical analysis. After the study, all data will be stored without identifying information at the Department of Nursing Science, University of Turku, in accordance with their institutional policy. The data will be destroyed ten years after study completion (TENK, 2019).

We respected common publication ethics in all published articles (Papers I, II and III). The authors' order and authorship were discussed between authors and agreed. All final versions of the manuscripts were accepted by all authors. All research methods were openly described and results reported in a truthful way.

6 Results

6.1 Characteristics of study participants

In **Phase I**, i.e. in the cognitive debriefing (face and content validity assessment) part, some participants were patients (n=4) (two males and two females) and some were nurses (n=5, all female) working in the outpatient clinics. The mean age of the patient participants was 41.30 (SD 8.05) years, whereas nurse participants' mean age was 45.20 (SD 13.91) years. Among the nurses, the average working experience in mental health care was 21.20 years (SD 12.71). In the potential clinical utility part (pilot test), the participants were patients (n=47, 27 female and 20 male). The participants were between 23–69 years, while the mean age was 41.10 years (SD 12.17). (Paper I)

In **Phase II**, some of the participants were nurses (n=15, 11 females and four males) working in the outpatient clinics, and some were patients (n=8, seven females and one male) receiving treatment in the clinics. Nurses' ages varied between 43 and 61 years, with a mean age of 49.47 years (SD 5.99). The majority of the nurse participants were registered nurses. Nurses' experience of working in mental health nursing varied from 1,5 to 38 years, with a mean working experience of 21.73 years (SD 8.18). Patient participants were between 21 and 65 years old, with a mean age of 43.87 years (SD 17.27). (Paper II)

In **Phase III**, i.e. in the quantitative part, the participants were nurses (n=16, 14 registered nurses, 2 mental health nurses). Nurses' ages varied between 41 and 61 years, and their mean age was 49.63 years (SD 5.83). Their experience of working in mental health care varied between 1.5 to 38 years. Their work experience comprised 21.72 years on average (SD 8.15). In the qualitative part, the participants were all nurses (n=15, 13 registered nurses and 2 mental health nurses). Their mean age was 49.47 years (SD 5.99, ranging between 43 and 61 years). The nurses had been working in mental health care for 21.73 years on average (SD 8.18, but their individual work experience ranged from 1.5 years to 38 years). (Paper III)

All patient participants in **Phases I** and **II** were diagnosed with schizophrenia spectrum disorder (WHO, 2024).

6.2 Validity and clinical utility of the HIP-F tool

With the permission of the original authors, the Health Improvement Profile (HIP) (Hardy et al., 2015; White et al., 2009) was translated from the original English language version into Finnish language by three bilingual and bicultural independent translators. Second, the three independently versions of the translated HIP-F were compared with the original HIP by the same three translators in five different rounds in total, where words, meanings and sentences were compared, and a pre-final version of the translated HIP-F was drafted in the Finnish language. Third, a professional translator who was not specialized in any health care terminology and was not familiar with the original HIP tool, conducted the blind back-translation of the pre-final HIP-F. Fourth, the original HIP and back-translated HIP was compared, focusing on similarities of the items and response format, and looking at structure of sentences, wording, relevance and meaning. After the translation process was finalized, the back-translated Finnish language version of the HIP was accepted by its copyright authors. (Paper I)

In cognitive debriefing, an expert panel of nurses and patients concluded that several items could be rated as very clear (I-CVI 0.89) or moderately clear (I-CVI 0.78). Some items were rated as not at all clear (I-CVI 0.44). Similarly, some recommended actions were rated as very clear (I-CVI 0.89), while a few items were rated as not at all clear (I-CVI 0.44). The average scale content validity index (S-CVI/Ave) for clarity was moderate for both items (0.68) and recommended actions (0.70). Despite having moderate content validity, many items in HIP-F received I-CVI values that were below acceptable levels, such as BMI, blood pressure, cervical smear, prostate and testicles, teeth, sleep, feet, eyes, exercise, alcohol intake, diet: 5 portions a day, diet: fat intake, fluid intake, caffeine intake, cannabis use, safe sex, urine, and sexual satisfaction. Regarding item relevance, nurses and patients found many items to be extremely relevant (I-CVI 1.00) or very relevant (I-CVI 0.89). Several items were rated as moderately relevant (I-CVI 0.78), or, not at all relevant (I-CVI 0.34). As regards recommended actions, several items were considered as extremely relevant (I-CVI 1.00) and most of the items were considered as very relevant (I-CVI 0.89). However, some items were considered as moderately relevant (I-CVI 0.78) and one item as not at all relevant (I-CVI 0.56). As regards relevance, the S-CVI/Ave was moderate for items (0.76) and high for recommended actions (0.82), with an overall average of 0.74. Furthermore, regarding relevance, several items got I-CVI values below acceptable levels: caffeine intake, BMI, prostate and testicles, sleep, feet, diet: 5 portions a day, alcohol intake, fluid intake, cannabis use, safe sex, urine, and sexual satisfaction.

Face validity was deemed acceptable, since no comments regarding item revisions were received during cognitive debriefing. Content validity indexes are

detailed in Table 1 of Paper I. (Paper I) A summary of the content validity indexes of the HIP-F items is presented in Table 5.

Table 5. Summary of the content validity indexes of the HIP-F items.

Content validity indexes	Item
Clarity	
I-CVI 0.89	waist circumference, pulse, liver function tests, and bowels
I-CVI 0.78	temperature, lipids levels, glucose, breast self-examination, menstrual cycle and smoking status
I-CVI 0.44- 0.67	BMI, blood pressure, cervical smear, prostate and testicles, sleep, teeth, eyes, feet, exercise, alcohol intake, diet: 5 portions a day, diet: fat intake, fluid intake, caffeine intake, cannabis use, safe sex, urine, and sexual satisfaction
Relevance	
I-CVI 1.00	waist circumference, pulse, liver function tests, glucose, cervical smear, and breast self-examination
I-CVI 0.89	blood pressure, lipid levels, menstrual cycle, and bowels
I-CVI 0.78	temperature, teeth, eyes, smoking status, exercise and diet: fat intake
I-CVI 0.34- 0.67	caffeine intake, BMI, prostate and testicles, sleep, feet, diet: 5 portions a day, alcohol intake, fluid intake, cannabis use, safe sex, urine, and sexual satisfaction

The HIP-F tool demonstrated clinical utility in detecting physical health issues, identifying 399 health problems among 47 participants. Every screened patient had at least one red-flagged item, with a range of 3–18 and an average of 8.6 (SD 3.12) red-flagged items per patient. (Paper I) A summary of the frequencies of red-flagged (unhealthy, action needed) items is provided in Table 6, while detailed cutoff points, along with flagged and unanswered items, are provided in Table 2 of Paper I.

Statistically significant gender differences were identified in two items. Females had more red-flagged health concerns in HIP-F item BMI than males did (92.6% vs. 70.0%, $p = 0.04$). Females were more frequently red-flagged in HIP-F item waist circumference than males were (96.3% vs. 65.0%, $p = 0.01$). A summary of red-flagged items across males and females is available in Table 3 of Paper I. (Paper I)

Regarding health parameter indexes, the only significant difference was in BMI measurements, with females having higher values than males (33.5 vs. 29.1, $p = 0.04$). Detailed results on physical health parameters across genders are presented in Table 4 of Paper I. (Paper I)

Table 6. Summary of the frequencies of red-flagged (unhealthy, action needed) HIP-items.

Item	n (%)
BMI	39 (83.0)
Waist circumference	39 (83.0)
Smoking status	23 (48.9)
Lipid levels	22 (46.8)
Eyes	21 (44.7)
Bowels	19 (40.4)
Liver function tests	19 (40.4)
Breast self-examination	18 (38.3)
Sleep	18 (38.3)
Sexual satisfaction	17 (36.2)
Diet: fat intake	16 (34.8)
Glucose	14 (29.8)
Pulse	14 (29.8)
Safe sex	13 (27.7)
Exercise	13 (27.7)
Teeth	12 (25.5)
Diet: 5 portions a day	12 (25.5)
Blood pressure	10 (21.3)
Menstrual cycle	10 (21.3)
Fluid intake	9 (19.1)
Cervical smear	7 (14.9)
Prostate and testicles	7 (14.9)
Feet	7 (14.9)
Caffeine intake	7 (14.9)
Temperature	5 (10.6)
Alcohol intake	4 (8.5)
Urine	4 (8.5)
Cannabis use	2 (4.3)

6.3 Nurses' and patients' perceptions of the HIP-F tool and areas for improvement

The use of the HIP-F tool in physical health screening was perceived to be comprehensive and to facilitate engagement. However, the overall impression was also that this type of screening is somewhat arduous and too time consuming. Some ideas were put forward for improving the screening itself as well as the screening practices. Participants noted that the HIP-F tool included several important items which had not been previously assessed. Nurses emphasized the lack of appropriate, structured screening tools in current clinical practice and deemed almost all HIP-F items feasible. For example, all HIP-F parameters assessed through laboratory tests, as well as measuring BMI and waist circumference, were perceived as feasible by most nurses. However, certain items, such as sexual satisfaction, were acknowledged

as sensitive and potentially challenging to discuss. All participants reported a positive experience with the HIP-F physical health screening. Through such screening, physical health diseases can be detected, and therefore adequate treatment for the patient can be started. Participants emphasized that the HIP-F screening should be conducted collaboratively. The patients appreciated having their physical health assessed. The nurses noted that the screening helped patients with SSD to engage in their own care. Furthermore, nurses noted that the screening enhanced discussion and increased knowledge among patients about their physical health and behaviors. Nurses observed that conducting the screening together with patients was particularly beneficial in cases where patients potentially had cognitive challenges. (Paper II)

A majority of the nurses thought that the HIP-F tool was too precise and complex to use in a mental health context, as nurses perceived that their task is to assess mental health, not physical health. Nurses felt some items were difficult to assess, e.g. items 'diet: fat intake' and 'activity'. Some measure units were unfamiliar to nurses, whereas some other items, such as 'urine' and 'feet' were experienced as weird by nurses. Nurses also stated that some items, for example 'temperature', were infeasible and should not be included in screening. Difficulties arouse also because of unclear cut-off points and delays in screening, because some laboratory tests were not routinely conducted in clinics. Although some nurses found the HIP-F tool easy to use, the length of the screening remained a challenge. Despite all difficulties, nurses stated that they don't need any training for physical health screening. However, one nurse suggested training on discussing sensitive topics, such as sexual satisfaction and safe sex. Conversely, patients found the screening easy to use and they thought the duration of the screening was acceptable. (Paper II)

Some nurses suggested that the HIP-F tool should be condensed, and the layout reorganized by adding a yellow column to indicate areas needing improvement. Nurses also proposed that patients should be allowed to complete parts of the screening at home, so that the nurses could save time during appointments. Patients did not suggest any improvements for screening. (Paper II)

6.4 Nurses' implementation fidelity and related factors in the use of the HIP-F

Implementation fidelity for conducting physical health screening with the HIP-F tool was low. Out of approximately 2,300 patients treated in outpatient clinics during the data collection period, only 0.87% (n=20) were screened. In these screenings, only 20% (n=4) of the forms were fully completed. The items that were most frequently left unassessed were glucose (n=6), BMI (n=4), lipid levels (n=4), and temperature (n=4). Details on unassessed items are shown in Table 1, Paper III. (Paper III)

Most HIP-F items were implemented with moderate fidelity. Screenings typically lasted 30–60 minutes. Detailed data of implementation fidelity is presented in Table 2, Paper III. (Paper III)

Based on the framework, a total of 15 sub-themes were grouped into four main themes relating to factors influencing nurses' fidelity to screening. A summary of this thematic categorization is presented in Table 3, in paper III. (Paper III)

Nurses identified several factors influencing implementation fidelity. Nurses experienced unstructured work tasks, lack of time and equipment, forgetting to perform screening and too complex screening tool as challenges in implementing screening. Some found the HIP-F tool complex and thought certain items were difficult to assess. Cognitive challenges among the patients, their willingness to participate, and the sensitive nature of some items also affected implementation. However, in cases where nurses discussed the screening in advance with the patients and conducted it collaboratively with the patients, participation and fidelity improved. (Paper III) A summary on implementation fidelity and related factors are presented in Table 7.

Table 7. Summary on implementation fidelity (content adherence) of HIP-F items and related factors.

Implementation fidelity and related factors	**Items and factors**
High fidelity	Waist circumference, pulse, blood pressure.
Moderate fidelity	BMI, temperature, lipid levels, liver function tests, glucose, alcohol intake, sleep, teeth, eyes, feet, breast, smoking, exercise, diet: 5 portions a day, diet: fat intake, fluid intake, caffeine intake, cannabis use, urine.
Low fidelity	Prostate and testicles, cervical smear, menstrual cycle, bowels, sexual satisfaction, safe sex.
Barriers for implementation	Unstructured work tasks. Lack of time to prepare for screening. Lack of equipment. Lack of reminders from supervisors. Too complex screening tool. Patients' cognitive deficits and willingness to participate.
Facilitators for implementation	HIP-F screening being implemented into regular work tasks. Discussing the screening in advance with the patient. Conducting the HIP-F screening collaboratively with patients.

6.5 Summary of the main results

This study aimed to examine the implementation of physical health screening for persons with schizophrenia spectrum disorders (SSD) using the Finnish Health Improvement Profile (HIP-F) tool. It focused on describing the tool's face and content validity, clinical utility, nurses' and patients' perceptions, as well as implementation fidelity and factors related to its use within the Finnish clinical mental health setting.

In **Phase I**, the HIP-F tool was found to have acceptable face validity and moderate content validity. Despite moderate content validity, many of the HIP-F items scored I-CVI values below acceptable values for clarity and relevance as assessed by an expert panel of nurses and patients. The HIP-F had potential clinical utility, since 399 health risks were detected in a sample of 47 persons with SSD (mean 8.6 per patient). (Paper I)

In Phase II, the HIP-F screening was perceived as a useful tool that enhanced patient engagement and awareness of physical health. Nurses valued conducting the screening collaboratively with patients but found the tool precise, complex, and time-consuming. While they did not feel training was necessary for conducting the screening, they saw value in training for discussing sensitive topics. Patients viewed the screening positively, finding it easy to use and of acceptable duration. Nurses suggested shortening the tool, reorganizing its layout by adding a yellow column, and allowing patients to partially complete the screening before appointments, while patients did not propose any improvements. (Paper II)

In **Phase III**, overall, implementation fidelity was generally low, with most HIP-F items implemented with only moderate fidelity. Several factors influenced the implementation fidelity. These factors were primarily related to nurses' work-related tasks, the limited resources and some patient-related challenges. (Paper III)

7 Discussion

7.1 Discussion of the main results

This study is the first in Finland to examine the implementation of physical health screening in persons with schizophrenia spectrum disorder (SSD) in a mental health care setting. The results of phases I–III are presented in a single, cohesive report using a socio-ecological model. This enabled the examination of factors related to the implementation of health screening at multiple levels. The results confirm that physical health risks are common in individuals with SSD. This is in line with previous international research. Although the HIP-F screening tool enabled the identification of these risks, its practical implementation faced several challenges. These challenges were particularly evident from the professionals' perspective.

The results of this study revealed that face validity of the HIP-F was deemed acceptable, similar to results obtained in an earlier HIP-study (White et al., 2009). In this study, the content validity was moderate, suggesting that experts deemed the HIP-F items to be relevant, even though such items were not assessed for psychometric properties (Faulkner et al., 2006). In the cognitive debriefing in this study, some HIP-F items were found to be unclear and irrelevant. This may be due to the fact that nurses and patients lacked knowledge regarding typical health issues in individuals with SSD (Howard & Gamble, 2011). However, after using HIP-F in screening, patients felt that all items were feasible. This highlights the significance of interactions on an interpersonal level, and the need to perform the screening in a collaborative manner, and the need for discussion between nurse and patient (Howard & Gamble, 2011). However, after using the HIP-F tool, nurses still thought some items were infeasible or felt that it was weird to include them in the screening (Mwebe, 2017). The nurses also felt that the HIP-F screening was too broad, which also influenced implementation, and suggested that the health screening should be shortened. It is possible that some nurses did not have knowledge of the fact that some health variables can be associated with schizophrenia spectrum disorder. For example, the item concerning body temperature was perceived as infeasible by nurses. However, monitoring temperature may be clinically relevant in people with SSD, as they can have altered thermoregulation (Shiloh et al., 2009), and

antipsychotics may cause hypothermia (Kreuzer et al., 2012) or neuroleptic malignant syndrome, in which fever is typical symptom (Pelonero et al., 1998).

In this study, the lack of knowledge might also be reflected in the results, as there was a difference between content validity and clinical utility. In cognitive debriefing, some items were assessed as irrelevant, but in the pilot test, these items were red-flagged for most of the patients. For example, the item for BMI was not assessed as clear or relevant in the cognitive debriefing phase, even though 83% of study participants in the pilot test had increased BMI values. The item eyes was being assessed only as moderately relevant and clear, but in the pilot study sample 44.7% of the patients reported that more than 2 years had passed since the last time they had their eyes checked. This is comparable to earlier findings, stating that eye health is often neglected by nurses in patients with SSD, despite the side effects of antipsychotic medications on eye health (Howard & Gamble, 2011). The results may indicate that on an organizational level, some typical health risks for SSD, such as overweight or eye health, are neither discussed nor screened, since nurses are not aware of the fact that they are important. Overall, the results of this study demonstrated that the HIP-F tool had potential clinical utility as a physical health screening tool, which is in line with results from a previous HIP study (Bressington et al., 2014). In this study, a sample of 47 persons with SSD was examined, altogether 399 physical health risks were identified, most of which were red-flagged regarding BMI and waist circumference, which is in line with earlier findings (Cook et al., 2015). The results in this study closely mirror those with other screening tools (Cook et al., 2015; Eskelinen et al., 2015), and this emphasizes the need for comprehensive screening rather than focusing only on laboratory tests (Butler et al., 2020; Wilson et al., 2014). Our study findings regarding central obesity in women were also similar to the findings in a previous study in Finland (Eskelinen et al., 2015). In our study, the occurrence of unhealthy lipid levels was higher, while smoking and alcohol use were lower than in the previous screening study (Cook et al., 2015). However, despite these benefits, nurses found the HIP-F tool too complex for clinical use, and this is a finding that is consistent with results from a previous HIP study in the UK (White et al., 2018). Similar results could also be seen in this study as regards low implementation fidelity. This in turn contrasts with the findings from Hong Kong, where community psychiatric nurses found the HIP-F tool useful and acceptable (Bressington et al., 2018a). However, in our study, nurses did not report that they had any need for training, which stands in contrast with previous study findings (Mwebe, 2017; Voort et al., 2024).

The results of this study demonstrate that both nurses and patients perceived the HIP-F tool as useful, and they emphasized the importance of a discussion about general health during the screening. This is a promising finding, because persons with SSD should be motivated to engage in their own care and they should also be

provided with psychoeducation (Lehman et al., 2010). In this study, we found that some items had never been discussed with patients, nor had those particular items been assessed. Patients in this study were pleased about being screened, since the HIP-F tool provided immediate information regarding their health and helped them increase their general knowledge. This is consistent with previous study results on patients' experiences (Butler et al., 2020). These findings emphasize the interaction on an interpersonal level when implementing screenings. In particular, they highlight the therapeutic relationship between nurses and patients. All of this is consistent with previous studies (Howard & Gamble, 2011). This has further impact on an individual level, as patients become aware of their general health and can make healthier life style choices. Enhancing knowledge related to a healthy lifestyle also helps patients to manage their underlying disease. Increased physical activity, for example, improves aerobic capacity, reduces SSD symptoms and improves quality of life in persons with SSD (Firth et al., 2017; Rosenbaum et al., 2014). These findings support previous results, implying that long-term, tailored interventions aiming for behavioural change should be included in routine mental health care in order to e.g. increase physical activity and encourage smoking cessation (Eskelinen et al., 2015). Although there is little evidence that screening alone affects health (Baxter et al., 2016), our study provides information that screening can at least detect latent diseases that, if left untreated, can be fatal. For example, in this study, one hypertension disease was identified through screening, which a previous screening study has also reported (Cook et al., 2015). Given the fact that mortality is higher in this patient group, even small increases in general health are noteworthy. In addition, conducting structured health screenings can significantly improve screening rates (Brunero & Lamount, 2009). Moreover, on a community level and on the organizational level, mental health services should tackle the ethical dilemma, i.e. they should provide evidence-based treatment aiming to control symptoms with effective antipsychotic medication and also to avoid physical morbidity (Eskelinen et al., 2015). This has been emphasized on a policy level, e.g. in an outline of the WHO framework, stating that monitoring for possible side-effects is crucial, and that this requires communication and knowledge between providers (Liu et al., 2017).

In line with previous findings, this study also revealed low implementation fidelity and suboptimal adherence (O'Brien & Abraham, 2021; Wilson et al, 2014). Recruitment of nurses and patients was challenging, and this was also reported in the UK (White et al., 2018). In contrast, in Hong Kong nurses conducted the HIP screening on all their participating patients (Bressington et al. 2018a). The results of this study are consistent with those previously mentioned, implying that although nurses perceived screening as important and comprehensive, screenings were poorly implemented (Voort et al., 2024). For example, in this particular study, items regarding cardiovascular risks and metabolic syndrome were implemented

inconsistently, which is in line with earlier results (O'Brien & Abraham, 2021), even though nurses were aware of the risk factors (Bolton et al., 2016). According to American Diabetes Association (2009), metabolic syndrome exists if three of the following health risks are detected: elevated blood pressure, lowered high density lipoprotein levels, elevated blood sugar levels, elevated triglyceride levels, or high waist circumference. However, comprehensive screening is crucial, since a few items alone do not provide an adequate assessment of metabolic risks (Eskelinen et al., 2015). Moreover, opposite to previous findings (O'Brien & Abraham, 2021), in this particular study the item waist circumference was implemented with high fidelity and the item eyes was implemented with moderate fidelity (Yalçın et al., 2019). In this study, less commonly implemented items were gender-related, and such items also included safe sex and sexual satisfaction. This may be explained by the fact that nurses perceived there was a need for training so that they would be able to discuss sensitive topics such as those previously mentioned, which is in line with previous studies (Ganiah et al., 2017). This may also show that such screenings are overall insufficient on an organizational level and on community level, since nurses had no routine in assessing such screenings.

This study revealed that barriers for implementing physical health screening in a Finnish clinical mental health setting are comparable to those in previous studies (Mwebe, 2017; Voort et al., 2024). In this study, nurses found that their work tasks were unstructured and saw this as a barrier for screening, similarly to earlier findings (Happell et al., 2013; Voort et al., 2024; Yalçın et al., 2019). The nurses in this study also felt frustrated, which can partly be explained due to their perceptions that the screening tool was too long or that some items were infeasible, but this still negatively influenced the screenings. This finding is consistent with prior research reporting that nurses' attitudes significantly correlate with their engagement in screenings (Bressington et al., 2018b; Ganiah et al., 2017; Robson et al., 2013). Some patient-related barriers were observed in this study, such as cognitive deficits and refusal to participate in screenings, and this significantly impacted implementation fidelity, which is in line with earlier studies (Mwebe, 2017; Voort et al., 2024). It is possible that in this study, just like in previous studies, screenings were offered only to those patients who were willing to participate immediately and whose mental state and cognition were sufficient for conversation (Happell et al., 2012b). However, this particular study is consistent with previous studies since a discussion with the patients beforehand and conducting the screening in collaboration with the patients enhanced their willingness to participate in the screenings (Howard & Gamble, 2011). On an individual level, illness-related factors that can be attributed to patients with SSD are important to be aware of, so that the screening can be successful. Furthermore, and similarly as earlier reported, nurses in this study told that they simply forgot to conduct screenings and would have needed reminders from the

nurse manager (Mwebe, 2017). This finding emphasizes the fact that a working relationship between nursing staff and nurse manager is significant in fostering a strong practice environment (Laschinger et al., 2009). Factors on the organizational level have a big impact and determine whether nurses will conduct physical health screenings or not, which can be seen in this particular study, as well as in a previous study (Happell et al., 2013). In addition, even when screening tools and equipment are provided, community level culture and organizational culture still affect nurses' self-confidence when it comes to conducting screenings (Tzeng et al., 2023).

Overall, the results of this study support previous studies that highlight the importance of time resources, equipment, strong leadership, clear instructions and organizational support for successful implementation of screening (Robson et al., 2013; Voort et al., 2024). At the time this study was conducted, structured physical health screenings were not part of regular treatment in outpatient clinics, and furthermore, clinics were not provided with e.g. measuring tapes and thermometers. For research purposes, this equipment was brought to the clinics, but it is still possible that nurses were not confident enough to use the equipment, as confidence has been reported to highly influence the willingness among nurses to conduct screenings (Mwebe, 2017; Yalçın et al., 2019). As previously reported, and similarly in this study, it appears that on a policy level, legislative processes and practice recommendations such as guidelines have had limited effect on clinical practice (Morrato et al., 2009) and there are gaps between actual practices and recommendations (Happell et al. 2013). This may reflect the gap between policy and clinical practice (Happell et al., 2012b). For example, nurses in this study reported that some annual laboratory tests that really should have been taken still had not been done in clinical practice, which delayed conducting the HIP-F screening. In this study, e.g. nurse managers and head doctors were partly present during information meetings related to the study, but they showed no interest towards screenings, which potentially can be interpreted as resistance among team leaders (White et al., 2018). This is surprising, since promoting physically active lifestyle should be included in treatment of schizophrenia (Eskelinen et al., 2015). Following the recommendations on a community level and on the organizational level is crucial, because people with SSD are vulnerable. Individuals themselves may not be able to identify and treat their physical health problems, which emphasizes the importance of screening (Castle & Li, 2023). Physical health screening provides information that can be used in the treatment of identified health problems or in the prevention of other diseases (Tosh et al., 2014). It is useful to motivate nurses so that they will perform their responsibilities when it comes to preventing illnesses, and training should be provided so that they can do this (Howard & Gamble, 2011). For example, in Finland registered nurses have a statutory responsibility to update their professional skills (Act on Health Care Professionals 559/1994, 1994; Health Care Act, 2010) and

ethical obligations guided by Professional Ethics and Collegiality (Finnish Nurses Association, 2024).

As demonstrated by the findings, nurses perceived that their main task is to take care of the mental health of patients, not their physical health, which has also been reported in previous studies (Happell et al., 2013; Howard & Gample, 2011). This may reflect a non-somatic culture on an organizational level or pinpoint education needs on a policy level (Bressington et al., 2018b; Robson et al., 2013). In order to improve the physical health of persons with SSD, the training requirement of nurses working in a mental health setting must be considered in nursing education and service provision (Bressington et al., 2018b). These practices should be visible for nursing students during their studies, and especially during their practice placements. Attitudes and practices from real life are significant for students so that they will apply this knowledge and develop their skills in physical health screening, as it is an integral part of holistic care (White et al., 2009). Interestingly, in the 1990s, basic nursing education both globally and in Finland shifted from college level, where nurses were trained in special fields, such as mental health, to universities of applied sciences and general education programs, where all graduates were general nurses without specialization. Since then, these changes have been criticized worldwide for the fact that mental health skills have suffered at the expense of physical health skills (Happell & Cutcliffe, 2011). However, it was not that evident, at least not in this particular study. Similarly, as reported in a previous study in the UK (Robson et al., 2013), our findings show that a mental health qualification may not provide nurses with the knowledge and skills required in physical health care of persons with SSD (Robson et al., 2013).

7.2 Validity, reliability and trustworthiness of the study

The specific reliability considerations in this study relate to the integration of qualitative and quantitative methods, as well as ensuring the validity and reliability of both approaches (Creswell & Plano Clark, 2017). The methods were chosen to complement one another, align with the research questions, generate relevant insights, and enable mutual corroboration of the findings. Reliability was strengthened through careful study design and by adopting a suitable strategy for integrating and comparing results across different methods. The qualitative component aimed to provide in-depth understanding of the phenomenon, while the quantitative part sought generalizability through a larger sample and statistical analyses (Creswell & Plano Clark, 2017).

In **Phase I**, the correlative validity of the HIP-F tool appeared to be promising, as the results were consistent with previous HIP studies (Bressington et al., 2014; Bressington et al., 2018a; Shuel et al., 2010; Thongsai et al., 2016). The pilot testing response rate (55%) was moderate and the whole research process carefully monitored. As a result, the study's overall findings can be considered relatively reliable. (Paper I)

In **Phase II**, the trustworthiness was ensured through credibility, confirmability dependability, and transferability (Polit & Beck, 2010). Credibility was strengthened by selecting participants with diverse perspectives and using both focus groups and individual interviews, which allowed for a comprehensive understanding of the topic (Renwick et al., 2019). The coding process was clearly demonstrated, and representative quotations were provided to illustrate the findings. Confirmability was ensured through careful reporting of the study phases, and dependability enhanced by consistently asking similar questions and maintaining an open dialogue among the authors (Polit & Beck, 2010). Transferability was improved by clearly describing the context, recruitment, participant characteristics, and data collection and analysis processes. (Paper II)

In **Phase III**, the trustworthiness of the study was enhanced by providing detailed descriptions of the analysis process and results, supported by quotations. Credibility was strengthened through the development of comprehensive categories. Reliability was increased by thoroughly documenting the analysis process, with tables included to clarify the results. Transferability was improved by clearly outlining the context, participant selection, participant characteristics, the data collection and analysis process. Internal validity was ensured through open dialogue among the researchers (Graneheim & Lundman, 2004). (Paper III)

7.3 Limitations of the study

In **Phase I**, some methodological limitations may potentially limit the validity and the generalisability of the results. First, the physical health variables assessed by the HIP-F tool may not be correlated with each other (Streiner et al., 2024). Second, in cognitive debriefing and pilot testing, the procedure based on Sousa's and Rojjanasrirat's (2011) was not possible to conduct in full. Third, some of the results of the study may have been a subject to reporting bias, as the data were collected using a self-report measure (Ainsworth et al., 2012). Fourth, this study used convenience sampling in participant recruitment, potentially increased selection bias toward individuals who are more willing to discuss their health issues (Chandler & Shapiro, 2016; Firth et al., 2016). Correspondingly, selection bias can also affect nursing staff, because we cannot be totally aware of how nurses chose to invite their patients to participate in the study. Fifth, although all patient participants in the pilot

test had a diagnosis of schizophrenia (WHO, 2024), the sample size was quite small, which might limit the generalizability of the results. Sixth, the pilot test data were collected by 17 different nurses, which may have introduced variation in how the HIP-F tool was applied and interpreted. (Paper I)

In **Phase II**, some limitations may have affected the reliability and transferability of the findings. The participants were recruited using a purposive sampling method, which probably caused bias, since those that were more interested in the topic were recruited (Firth et al., 2016; Mulder et al., 2014). Although the importance of inclusion and exclusion criteria was explained to nurses, the patient recruitment process may still be biased towards selection of patients who are more motivated and able to participate, and thus more cooperative. In addition, although all patients had a psychotic disorder (WHO, 2024), the relatively small sample size may limit the transferability of the findings. Accordingly, the participants were recruited from only one hospital, and since the ethnic background group was narrow, this may weaken the transferability of the findings outside of Finland. The qualitative research design itself may have imposed limitations on the research. The presence of the researcher during the interviews could have influenced the answers of the interviewees (Firth et al., 2016; Schonfeld & Mazzola, 2012). The researcher who interviewed the study participants had knowledge of the research topic and was experienced of working with people with schizophrenia spectrum disorders. On the other hand, strong presuppositions may have caused reporting bias, which weakens credibility. In addition, the relative short duration of the interviews may have limited the chances of understanding the topic on a deeper level. Similarly, the amount of nurse participants in the focus groups was small, which may have limited for some level the potential for more productive discussion of the studied topic. Although the patients were interviewed individually, it is possible that the patients were careful to share their views and experiences openly. Moreover, digitally recorded interview transcripts were not returned to patients or nurses for review. The data were not formally translated back, which may weaken the credibility of the results. Despite these limitations, the study has some strengths and is informative and rich in knowledge on nurses' and patients' perceptions. (Paper II)

In **Phase III**, strengths and limitations are highly connected to the design of the study. In the quantitative part, there was one limitation which potentially influenced the qualitative part. The HIP-F tool includes a manual, comprising more detailed information on the items and cut off points (Hardy et al., 2015; White et al., 2009). However, nurses were not provided with the HIP-F manual for screening, which may have influenced the chances of achieving optimal fidelity levels. The original intention was to conduct another randomized controlled trial study, dividing half of the nurses into an intervention group with HIP-F, and by doing so, we aimed to avoid bias from those nurses who were scheduled to provide treatment in the usual way. In

an intention to prevent this kind of bias, we may have inadvertently introduced a different bias. In the qualitative part, the researcher was present in the interviews, which might have influenced the nurses' answers (Schonfeld & Mazzola, 2012). The researcher had experience working with SSD patients and was familiar with the research topic, which possibly limited the participants' willingness to express their thoughts. On the other hand, bias may also have been caused by the researcher's presuppositions and lack of openness towards the subject, which potentially weakened the credibility of the research. In addition, the small number of study participants in the focus group interviews has probably limited the group discussions.

Despite these limitations, this study has several strengths. These include the use of the CFIF framework (Carroll et al., 2007), the development of an adherence scoring system, the combination of qualitative and quantitative methods, and the integration of findings. Qualitative interview results were also combined with quantitative adherence data to deepen the understanding of the studied phenomena and to strengthen the overall interpretation. (Paper III)

Overall, not having public and patient involvement (Pizzo et al., 2015) in the designing and conducting of all phases of this study could be one limitation. Involving patients and the general public could have offered valuable perspectives into the study processes and outcomes.

7.4 Contributions to knowledge

This study contributes to the current existing knowledge by integrating a mixed methods approach in order to examine the implementation of physical health screening for persons with SSD using the Finnish Health Improvement Profile (HIP-F) tool. While previous studies have often focused on reporting physical health problems for patients with SSD, as well as nurses' general views and attitudes towards physical health screening, the unique contribution of this study lies in our comprehensive examination of how a screening program is being implemented. This was the first study to translate and validate a Finnish language physical health screening tool that is designed to be used with outpatients with SSD in a Finnish mental health setting. This study produced unique information about the views of an expert panel consisting of nurses and patients in a Finnish mental health setting during the validation phase. This study also reflected their knowledge of the health items related to schizophrenia spectrum disorder. The nurses' and patients' detailed descriptions of how they perceived the health screening helped to understand what kind of knowledge, skills and readiness the nurses had to implement the health screening; and also, what the patients' views and needs were. In addition to the health screening being performed, new knowledge was gained about a novel way of assessing health, compared to the traditional way with a self-filled questionnaire,

which the patient fills out by themselves. New knowledge was also gathered on screening, including e.g. cancer screenings, and on lifestyles in the comprehensive health assessment. This may be taken for granted by the majority of the Finnish population, and such screenings have not been considered in conjunction with clinical mental health nursing practice. In addition, this study provided ideas for improving health screening and screening practices. Furthermore, it produced knowledge to administrative bodies on what kind of resources are needed for successful screening practices. Moreover, this study contributed to the knowledge of current physical health screening practices in Finnish mental health settings. Particularly, the use of a socio-ecological model allowed for a more comprehensive understanding of how different societal levels interact, on the individual, interpersonal, organisational and community level as well as on a policy level, and how they influence the implementation of physical health screening among persons with SSD.

This study can pave the way for future research by demonstrating the relevance and context of comprehensive health screenings and the appropriate context for treatment of SSD. In addition, this study provides practical insights in improving screening procedures and practices for people with complex health issues.

7.5 Implications of the study

Clinical practice

This study provides important insights for clinical practice regarding the physical health screening of individuals with schizophrenia spectrum disorders (SSD). The findings support the use of the Finnish Health Improvement Profile (HIP-F) tool as a structured method for identifying physical health and health behaviour risks in this population. The HIP-F demonstrated moderate content validity and potential clinical utility, and it was generally well accepted by both patients and nurses. Importantly, patients were willing to engage in screening, highlighting the potential to increase patient involvement in their own care. However, the results also revealed challenges in practical implementation, particularly from the perspective of healthcare professionals. Nurses found the tool time-consuming and complex, indicating a need for streamlining the process and providing preparatory training. Strengthening staff knowledge, especially in recognizing less obvious physical health risks, could improve the effectiveness of screening. Furthermore, the study's findings related to nurses' adherence and the factors influencing it offer valuable guidance for designing interventions, allocating resources, and supporting staff in future implementation

efforts. These implications should be considered when planning and developing physical health screening practices in mental health care settings.

Health care administration

This study provides valuable insights into the resources, knowledge, and equipment required for effective physical health screening in mental health care, as well as the organizational and leadership support needed to facilitate nurses' roles. The findings emphasize that nurses are well positioned to carry out physical health screenings for persons with schizophrenia spectrum disorders (SSD), but their ability to do so depends on having sufficient time, appropriate tools, adequate equipment, and up-to-date knowledge. Addressing these factors, such as structured work tasks, leadership engagement, and alignment with clinical guidelines, can help close the gap between recommended care and actual practice. Importantly, all identified barriers to implementation fidelity are manageable, indicating that physical health screening for people with SSD can be successfully improved within Finnish clinical mental health settings.

Nursing science

This study demonstrates that individuals with schizophrenia spectrum disorders (SSD) can be meaningfully involved in research and that diverse methodological approaches are applicable when studying this population. The findings highlight the relevance and feasibility of nursing science in mental health contexts, supporting the need for increased visibility of nursing-led research. Importantly, the study reinforces the fact that nurses' roles and responsibilities should be guided not only by medical science but also by research based on nursing practice. It also emphasizes the importance of developing and evaluating complex nursing interventions in order to enhance clinical care.

Nursing education

The findings of this study can inform nursing education by supporting the development of curricula that emphasize physical health care within mental health settings. They highlight the importance of equipping future nurses with both the skills and the confidence to implement physical health interventions for patients with mental health disorders. These results can also guide the planning of staff supervision and continuing professional development, ensuring that nurses are supported in their clinical roles. The reported barriers should be taken into account when designing training programs and considering the implementation of physical health screenings.

Importantly, the study underscores the influence of attitudes in psychiatric care, emphasizing the need to introduce a holistic, integrated care approach early in nursing education so that students can adopt this perspective in their future clinical practice.

7.6 Suggestions for future research

Future research is needed across individual, interpersonal, organizational, community, and policy levels to improve physical health screening among persons with schizophrenia spectrum disorders (SSD) in clinical mental health settings. Further studies are needed to confirm the findings of this study and to evaluate the effectiveness of structured screening tools and health promotion interventions in this population, particularly within the Finnish context. Although this study did not include a randomized controlled trial, such a study is highly recommended to assess the impact of HIP-F screening more robustly.

Involving patients with SSD, caregivers, and members of the general public in the design and conduct of future studies is also recommended. Their participation could ensure that research addresses the most relevant concerns of this vulnerable group and enhances the practical applicability of findings. Additionally, studies focusing on nurse-patient interaction could support the development of more effective approaches to screening and facilitate conversations on sensitive topics. Research on organizational readiness and capacity to implement physical health screening is also needed. Finally, at community and policy levels, further investigation is required to better understand and address the gap between healthcare policies, clinical guidelines, and actual nursing practices in mental health care.

8 Conclusions

At the **individual level**, the findings of this study indicate that persons with schizophrenia spectrum disorders (SSD) commonly experience significant physical health problems, which is all consistent with previous international research. This study confirms that the situation is similar in Finland. Although many of these individuals may be both willing and able to participate in physical health screenings, it is essential to take into account their potential cognitive impairments. Such screenings can play an important role in increasing patients' awareness of their physical health and in supporting the overall management of their mental health condition.

At the **interpersonal level**, nurses' knowledge and engagement are essential for successful screenings. Nurses need education on SSD-related health issues, and they also need to be confident enough to discuss sensitive topics. Effective interaction and discussion between nurses and patients are crucial.

At the **organizational level**, physical health screening of persons with SSD is insufficient in Finnish clinical mental health practice. Leadership needs to be strengthened, and nurses' roles should be clearly defined. Nurses should be allocated sufficient time and provided with the necessary resources, equipment, and evidence-based screening tools to effectively manage physical health screening for individuals with SSD.

At the **community level**, structured physical health screenings should be integrated into health services. Roles and responsibilities for conducting screenings need to be clarified, and practices should be developed. A more holistic treatment culture is necessary.

At the **public policy level**, strategies to enhance the physical health of individuals with SSD need to be more visible. Guidelines should be followed, and appropriate education should be provided.

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Appendix 1. Search strategy for the review of literature.

Database	Search terms	Results
Pubmed (Medline) English Journal Articles	(“schizophrenia spectrum disorder*” OR “schizoaffective disorder*” OR "schizophrenia spectrum and other psychotic Disorders"[Mesh] OR “psychotic disorde*” OR “serious mental illness*” OR “severe mental illness*” OR “severe mental disorder*” OR “mental illness*” OR “psychotic disorder*” OR “mental health*” OR SMI OR MI OR SSD OR SMD) AND (“physical health screen*” OR “physical health monitor*” OR “health check*” OR “health exam*”) AND (“health care*” OR “mental health care*” OR “mental health treatment*” OR “out-patient clinic*” OR “outpatient clinic*” OR “out patient clinic*” OR “in-patient clinic*” OR “inpatient clinic*” OR “in patient clinic*” OR “mental health service*” OR "Mental Health Services"[Mesh])	153
CINAHL English Journal Articles	("schizophrenia spectrum disorder*" OR "schizoaffective disorder*" OR "psychotic disorde*" OR "serious mental illness*" OR "severe mental illness*" OR MH "Psychotic Disorders+" OR "mental illness*" OR "psychotic disorder*" OR "mental health*" OR SMI OR MI OR SSD) AND ("physical health screen*" OR "physical health monitor*" OR "health check*" OR "health exam*") AND ("health care*" OR "mental health care*" OR "mental health treatment*" OR "out-patient clinic*" OR "outpatient clinic*" OR "out patient clinic*" OR "in-patient clinic*" OR "inpatient clinic*" OR "in patient clinic*" OR "mental health service*" OR MH "Mental Health Services+")	9
APA PsycInfo English Journal Articles	(DE "Schizophrenia" OR DE "Acute Schizophrenia" OR DE "Catatonic Schizophrenia" OR DE "Paranoid Schizophrenia" OR DE "Process Schizophrenia" OR DE "Schizoaffective Disorder" OR DE "Schizophrenia (Disorganized Type)" OR DE "Schizophreniform Disorder" OR DE "Undifferentiated Schizophrenia" OR "schizophrenia spectrum disorder*" OR "schizoaffective disorder*" OR "psychotic disorde*" OR "serious mental illness*" OR "severe mental illness*" OR "mental illness*" OR "psychotic disorder*" OR "mental health*" OR smi OR mi OR ssd) AND ("physical health screen*" OR "physical health monitor*" OR "health check*" OR "health exam*") AND ("health care*" OR "mental health care*" OR "mental health treatment*" OR "out-patient clinic*" OR "outpatient clinic*" OR "out patient clinic*" OR "in-patient clinic*" OR "inpatient clinic*" OR "in patient clinic*" OR "mental health service*" OR DE "Community Mental Health Services" OR DE "Community Psychiatry" OR DE "Public Mental Health" OR DE "Serious Mental Illness")	25
TOTAL		187

Appendix 2. Details of previous studies related to implementation of physical health screening for persons with SSD.

Authors, year	Country	Participants	Research method
Bressington et al., 2014	Hong Kong	Patients (n=148)	A consecutive prospective case series study
Bressington et al., 2018a	Hong Kong	Patients (n=137) Community psychiatric nurses (n=12)	A parallel-group, open-label, cluster-randomized, controlled trial (RCT) study
Bressington et al., 2018b	Hong Kong	Nurses (n=481)	A cross-sectional survey study
Butler et al., 2020	UK	Clinicians (n=15) Patients (n=14)	A mixed-methods study
Cook et al., 2015	USA	Patients (n=457)	A survey study
Ganiah et al., 2017	Jordan	Mental health nurses (n=202)	A descriptive cross-sectional study
Eskelinen et al., 2015	Finland	Patients (n=276)	A cross-sectional study
Faulkner et al., 2006	Canada	Patients (n=35)	
Fujiwara et al., 2024	Japan		A multicenter, single-arm feasibility study
Happell et al., 2012b	Australia	Nurses (n=38)	A qualitative, exploratory study
Happell et al., 2013	Australia	Nurses (n=38)	A qualitative exploratory study
Howard & Gamble, 2011	UK	Mental health nurses (n=37)	A descriptive survey study
Knight et al., 2017	USA	Nurses (n= 154)	A survey study
Meepring et al., 2023	Thailand	Patients with early-stage psychosis (n=30)	A randomized controlled trial study
Mwebe et al., 2017	UK	Mental health nurses (n=10)	A qualitative exploratory study.
O'Brien et al., 2021	New Zealand	Clinical records in primary care (n=46) and secondary care (n=47)	An audit study (+ survey)
Robson et al., 2013	UK	Mental health nurses (n = 585)	A postal questionnaire survey study A secondary analysis of cross-sectional data
Thongsai et al., 2016	Thailand	Patients (n=105)	A cross-sectional study
Voort et al., 2024	Netherlands	Mental health nurses (MHNs) (n=15)	A generic descriptive qualitative study
White et al., 2009	UK	Mental health nurses, psychiatrists, physicians and experts by experiences	Practice development

Authors, year	Country	Participants	Research method
White et al., 2018	UK	Patients (n=173) Nurses (n=60)	A single-blind, cluster randomized controlled trial
Wilson et al., 2014	Australia	Patients (n=155/224)	A mixed-methods study
Yalçın et al., 2019	Turkey	Nurses (n=184)	A cross-sectional study
Yeomans et al., 2014	UK	Patients (n=335)	A cross-sectional retrospective service evaluation

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