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NURSES' ACCEPTANCE OF AN INTERNET-BASED SUPPORT SYSTEM IN THE CARE OF ADOLESCENTS WITH DEPRESSION

Marjo Kurki

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To Aaro
and
All my close ones

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Department of Nursing Science, Faculty of Medicine, University of Turku, Finland
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ABSTRACT

The overall goal of the study was to describe nurses' acceptance of an Internet-based support system in the care of adolescents with depression. The data were collected in four phases during the period 2006 – 2010 from nurses working in adolescent psychiatric outpatient clinics and from professionals working with adolescents in basic public services. In the first phase, the nurses' anticipated perceptions of the usefulness of the Internet-based support system before its implementation was explored. In the second phase, the nurses' perceived ease of computer and Internet use and attitudes toward it were explored. In the third phase, the features of the support system and its implementation process were described. In the fourth phase, the nurses' experiences of behavioural intention and actual system use of the Internet-based support were described in psychiatric out-patient care after one year use. The Technology Acceptance Model (TAM) was used to structure the various research phases.

Several benefits were identified from the nurses' perspective in using the Internet-based support system in the care of adolescents with depression. The nurses' technology skills were good and their attitudes towards computer use were positive. The support system was developed in various phases to meet the adolescents' needs. Before the implementation of the information technology (IT)-based support system, it is important to pay attention to the nurses' IT-training, technology support, resources, and safety as well as ethical issues related to the support system. After one year of using the system, the nurses perceived the Internet-based support system to be useful in the care of adolescents with depression. The adolescents' independent work with the support system at home and the program's systematic character were experienced as conducive from the point of view of the treatment. However, the Internet-based support system was integrated only partly into the nurse-adolescent interaction even though the nurses' perceptions of it were positive.

The use of the IT-based system as part of the adolescents' depression care was seen positively and its benefits were recognized. This serves as a good basis for future IT-based techniques. Successful implementations of IT-based support systems need a systematic implementation plan and commitment from the part of the organization and its managers. Supporting and evaluating the implementation of an IT-based system should pay attention to changing the nurses' work styles. Health care organizations should be offered more flexible opportunities to utilize IT-based systems in direct patient care in the future.

Keywords: Internet-based support system, information technology, adolescent, depression, acceptance, nurse, adolescent psychiatric out-patient care, Technology Acceptance Model

Marjo Kurki

HOITAJIEN INTERNET -PERUSTAISEN TUKIMUODON HYVÄKSYNTÄ MASENTUNEIDEN NUORTEN HOIDOSSA

Hoitotieteen laitos, Lääketieteellinen tiedekunta, Turun yliopisto, Suomi
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TIIVISTELMÄ

Tutkimuksen tavoitteena oli kuvata hoitajien näkökulmasta Internet -perustaisen tukimuodon hyväksyntää masentuneiden nuorten hoidossa. Tutkimusaineisto kerättiin neljässä vaiheessa vuosien 2006 ja 2012 välisenä aikana nuorisopsykiatrian avohoidon poliklinikoilta ja nuorten parissa perustasolla työskenteleviltä ammattihenkilöiltä. Ensimmäisessä vaiheessa ennen tukimuodon käyttöönottoa kuvattiin hoitajien kokemia hyötyjä Internet -perustaisen tukimuodon käytössä osana masentuneiden nuorten hoitoa. Toisessa vaiheessa selvitettiin miten hoitajat käyttävät tietokonetta ja Internetiä päivittäin ja miten he asennoituvat tietoteknologiaa kohtaan. Kolmannessa vaiheessa kuvattiin Internet -perustaisen tukimuodon ominaisuuksia ja käyttöönottoa. Neljännessä vaiheessa kuvattiin hoitajien kokemuksia Internet-perustaisen tukimuodosta käytöstä ja hyväksynnästä osana masentuneiden nuorten hoitoa vuoden käyttökokemusten jälkeen. Tutkimuksen teoreettisena viitekehyksenä käytettiin Technology Acceptance Model (TAM) -teoriaa, jonka mukaan jäsennettiin eri tutkimusvaiheet ja -tulokset.

Hoitajat suhtautuivat myönteisesti Internet -perustaisen tukimuodon tarjoamiin mahdollisuuksiin osana masentuneiden nuorten hoitoa. Hoitajien tietoteknologiataidot olivat hyvät ja asenteet olivat myönteisiä sen hyödyntämiseen hoitotyössä. Internet-perustaista tukimuotoa kehitettiin vaiheittain nuorten tarpeita vastaaviksi. Hoitajien tarpeisiin perustuva harjoittelu, teknologiatuki, resurssit, tukimuodon turvallisuus ja eettiset näkökulmat tulee huomioida ennen Internet-perustaisen tukimuodon käyttöönottoa. Yhden vuoden käyttökokemusten jälkeen hoitajat kokivat Internet -perustaisen tukimuodon hyödyllisenä masentuneiden nuorten hoidossa. Erityisesti nuorten itsenäinen kotona työskentelyä ja ohjelman systemaattisuus koettiin hoitoa edistäviksi tekijöiksi. Hoitajien oli kuitenkin vaikea tukea nuoria tukimuodon käytössä keskusteluissa vastaanotolla. Nuorten Internet -perustaisen tukimuodon hyväksyntä osana masentuneiden nuorten hoitoa oli siten vain osittaista.

Tietoteknologian hyödyntämiseen osana masentuneiden nuorten hoitoa suhtaudutaan myönteisesti ja sen hyödyt tunnistetaan. Tämä antaa uusien tietoteknologia -perustaisten menetelmien kehittämiselle hyvän pohjan. Onnistunut käyttöönotto vaatii systemaattisen käyttöönottosuunnitelman, jota hoitotyön esimiehet ja organisaatio ovat sitoutuneet toteuttamaan. Tietoteknologia -perustaisten menetelmien käyttöönoton tukemisessa ja arvioinnissa tulee kiinnittää huomiota hoitajien työtapojen muuttamiseen. Tulevaisuudessa terveydenhuollon organisaatioiden tulee tarjota hoitotyöhön joustavampia mahdollisuuksia tietoteknologian hyödyntämiseen suorassa potilastyössä.

Asiasanat: Internet -perustainen tukimuoto, tietoteknologia, nuori, masennus, hyväksyntä, hoitaja, nuorisopsykiatrinen avohoito, Technology Acceptance Model

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ABBREVIATIONS

BI	Behavioural intention
CBT	Cognitive behavioural therapy
ECDL test	European Computer Driving Licence test
ETENE	National Advisory Board on Health Care Ethics
FITT	Fit between Individuals, Task and Technology
HMG/DH	Her Majesty's Government/Department of Health
ICT	Information and Communication Technology
IDT	Innovation Diffusion Theory
IT	Information technology
NICE	National Institute for Health and Clinical Excellence
NIHCM	National Institute for Health Care Management
OECD	Organization for Economic Co-operation and Development
OSF	Official Statistics of Finland
PEOU	Perceived ease of use
PU	Perceived usefulness
TAM	The Technology Acceptance Model
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UK	United Kingdom
UTAUT	Unified Theory of Acceptance and Use of Technology
VC	Videoconferencing
WHO	World Health Organization

LIST OF ORIGINAL PUBLICATIONS

The dissertation is based on the following publications referred to in the text by the Roman numerals I-IV.

I Kurki M., Koivunen M., Anttila M., Hätönen H. & Välimäki M. 2011. Usefulness of Internet in adolescent mental health outpatient care. Journal of Psychiatric and Mental Health Nursing 18, 265–273.

II Kurki M., Hätönen H., Koivunen M., Anttila M. & Välimäki M. 2013. Integration of computer and Internet-based programmes into psychiatric out-patient care of adolescents with depression. Informatics for Health and Social Care 38(2), 93–103.

III Välimäki M., Kurki M., Hätönen H., Koivunen M., Selander M, Saarijärvi S. & Anttila M. 2012. Developing an Internet-based support system for adolescents with depression. Journal of Medical Internet Research - Research Protocols 1(2), e22.

IV Kurki M., Anttila M., Koivunen M., Marttunen M. & Välimäki M. 2014. Nurses' experiences of the use of an Internet-based support system for adolescents with depression disorders. Submitted.

1. INTRODUCTION

Globally mental health problems have a significant impact on people's well-being and quality of life (Whiteford et al. 2013, WHO 2013) causing a public health problem worldwide (Jané-Llopis & Braddick 2008). It has been estimated that psychiatric disorders currently account for about 13% of the global burden of disease, and this will rise in future (Mathers & Loncar, 2006). Depression is one of the most prevalent health problems in Europe among adults and adolescents (European Union 2009, Ministry of Social Affairs and Health 2013). Approximately 20% of adolescents suffer from some kind of mental health problem (Kessler et al. 2007, Merikangas et al. 2010, WHO 2012a). Depression is connected to adolescents' suicidal ideation and attempts (Pelkonen et al. 2011) which are the second most common cause of death among adolescents from age 15 to adults age 44 years (WHO 2013). However, only 10-15% of adolescents with mental health problems receive the needed treatment from health services globally (WHO 2005, NIHCM Foundation 2010, Herrman et al. 2012). In Finland, about 20% of those aged 25 years have received some psychiatric care but still only half of adolescents with mental health problems receive treatment (Paananen et al. 2012). Further, depression causes extensive human suffering impairing working performance and educational achievement (European Communities 2005, WHO 2012a) and causing increased disability-adjusted life years (Whiteford et al. 2013). There is good reason to argue that preventing adolescents' mental health problems could reduce the burden on individuals and families and also reduce the financial costs on many levels (NIHCM Foundation 2010).

Easy access services and evidence-based interventions are needed in the care of adolescents with depression. Early recognition of depression disorders and effective treatment in adolescence reduce the persistence of depressive and various lifelong negative consequences in adulthood. However, in many European countries adolescents' mental health problems are untreated and there are long waiting periods before they receive adequate care (Horwitz et al. 2007). In Finland, national guideline (Mieli 2009) emphasizes out-patient care and the equality of mental health care in Finland (Ministry of Social Affairs and Health 2009) and requires services to be near to users and easily accessible for them (Health Care Act 1326/2010). Moreover, adolescent mental health treatment should consider their daily living environment including family, school and friends (Ministry of Social Affairs and Health 2009, HMG/DH 2011, Depression Current Care 2013). However, there is a lack of easy access mental health services and inequality in the quality of care in Finland (Ministry of Social Affairs and Health 2009).

IT-based applications are potentially useful and effective interventions to reach and support adolescents with mental health problems. Internet-based programmes for adolescents have been developed for the prevention or care of depression, anxiety or stress, emotional distress, eating disorders, alcohol and drug abuse and smoking cessation (Slone et al. 2012). However, despite evidence of the effectiveness of Internet-based support systems for adults with depression (Griffiths & Christensen 2006, Kaltenhaler et al. 2006, Spek et al. 2007, Bee et al. 2008), there are only few Internet-based interventions for adolescents with depression disorders (Slone et al. 2012). Although it is known that for adolescents' an essential part of communication and searching information includes sensitive health issues (Horgan & Sweeney 2010, Nelson & Bui 2010, Mitchell et.al 2013), IT is rarely used directly in care of adolescents (Winblad et al. 2012). Adolescents' commitment to the use of a new intervention is closely related to the support they receive from healthcare professionals (O'Kearney et al. 2006, Neil et al. 2009). Thus nurses' participation in the IT implementation process is significant for the acceptance and usefulness of new Internet-based interventions (Koivunen et al. 2008a).

The rapid global technology revolution has affected health care and nursing staff (Brailer & Thompson 2004). The spread of IT provides mental health care with a variety of opportunities in practice, teaching, delivering intervention, searching information and in research. Most nurses, including those in the field of mental health care, currently use IT in their daily work. (Maheu et al. 2005.) However, IT-based applications have been utilized and, for example, digital communication between patient and health care staff remains rare in Europe (Himanen 2013). In Finland, there is a lack of user-centeredness and direct IT-based services including IT-based self-help and home-delivered interventions (Winblad et al. 2012). In future, due to people's increasing interest in their health and well-being, technology-based self-help programmes could play a very significant role in the promotion of mental health. This could also mean remarkable cost saving in public health care. (Linturi et al. 2013.) Therefore, health care personnel need to be able to use new technologies, and positive progress among nurses has indeed been observed (Kuo et al. 2013). However, health care personnel do not automatically use new innovations; a systematic implementation plan is needed to facilitate successful implementation (Klein & Knight 2005).

According to the literature nurses' acceptance of IT in health care settings has been facilitated by various factors (Holden & Karsh 2010, Koivunen et al. 2010, Ketikidis et al. 2012, Li et al. 2013). Perceived effectiveness and benefits in quality of care (Zwaanswijk et al. 2011), positive attitudes (Koivunen et al. 2014), good IT skills (Koivunen 2008b) and voluntary use of IT facilitate nurses' commitment to using and eventually accepting IT (Li et al. 2013). Organizational factors, such as training (Gagnon et al. 2009), organizational support, technology functionality (de Veer et al. 2011), IT support (Li et al. 2013) and positive team climate (Koivunen et al. 2014) are conducive to accepting IT in health care settings. However, research has shown that the implementation of IT in mental health care may be problematic, with difficulties related to nursing staff's attitudes and IT skills (Koivunen et al. 2008b Takian et al. 2012, Li et al. 2013) or resistance to a new IT-based intervention (Schwartzman et al. 2012). IT implementation barriers have been found to concern the actual use related to the technology itself, such as technology complexity and lack of IT support (Eley et al. 2009, de Veer et al. 2011). In addition, if health care personnel do not perceive that IT promotes the effectiveness and quality of care, their commitment to using it may be low (Zwaanswijk et al. 2011, Schwartzman et al. 2012).

However, not enough is known about the factors associated with nurses' acceptance (Davis et al. 1989, Davis 1993, Holden & Karsh 2010) and successful implementation (Klein & Knight 2005) of Internet-based interventions in the psychiatric out-patient care of adolescents with depression (Griffiths & Christensen 2006). The information obtained through this study will be useful when implementing new IT-based methods in psychiatric adolescent care and in supporting nurses' acceptance in the implementation process. Moreover, the study topic is significant because new evidence-based interventions are clearly needed in the care of adolescents with depression (Cheung et al. 2007) and one alternative may be Internet-based self-help and user-friendly programmes (Griffiths & Christensen 2006).

The purpose of this study was to describe nurses' acceptance of an Internet-based support system for adolescents with depression. The Technology Acceptance Model (TAM) was used to structure the various research phases and to enhance the understanding of nurses' acceptance of the Internet-based support system and the implementation process. In this study, according to TAM, nurses' acceptance of the Internet-based support system was viewed through the concepts of perceived usefulness, ease of use and attitudes before the Internet-based support system was introduced. In the process of developing the Internet-based support system, based on TAM, external variables were considered. After using the Internet-based support system nurses' behavioural intentions and actual use of the

system were studied through TAM. (Davis et al. 1989.) Further, TAM theory has been widely used and evaluated in different health research contexts (Holden & Karsh 2010).

The study was a part of the Depis.Net study (CC-NAPN-19309) funded by the Academy of Finland (8214245) that targeted adolescents with depression in psychiatric out-patient clinics. This doctoral study focused on nurses' perspectives in the implementation process of a new Internet-based support system which was developed in the University of Turku, Department of Nursing Science. The basis of the research project was in the Mieli.Net study funded by the Academy of Finland. The Depis.Net study was based on implementation of the good practices obtained from the Mieli.Net study to improve the quality of care of adolescents with mental health problems. The study will increase the knowledge about the successful implementation and utilization process of Internet-based methods and how to encourage nurses to accept IT, especially in out-patient mental health care services for adolescents. This study was conducted in the field of clinical nursing science. In addition, the study will increase knowledge in nursing clinical practices where the use of IT will be linked to direct patient care.

2. LITERATURE REVIEW

2.1 Adolescents in mental health services and information technology

2.1.1 Mental health problems in adolescence

Mental health problems have a significant impact on the global burden of disease (Whiteford et al. 2013, WHO 2013). Psychiatric disorders account for some 13% (Mathers & Loncar 2006) and depression alone for about 4% of the global burden of disease. In Europe, mental health problems, such as depression, anxiety and schizophrenia, are among the leading causes of disability and early retirement, which causes great human suffering and a major economic burden (WHO 2013). The reason for the enormous economic impact of depression is associated with the lost work productivity in adulthood (Wang et al. 2003). It is expected that the number of psychiatric disorders will increase globally in the future (Mathers & Loncar 2006) causing increased sick leaves, risk of early retirement (Wedegaertner et al. 2013) and disability-adjusted life years (Whiteford et al. 2013). In 2010 the depression-based pension expenditure and the sickness benefits was EUR 639 million (Ministry of Social Affairs and Health 2011).

About 20% of adolescents suffer from some kind of mental health problem (Merikangas et al. 2010, WHO 2012a) causing a public health problem worldwide (Jané-Llopis & Braddick 2008, WHO 2009). Approximately 10% of adolescents suffer from serious mental health disorders which have an impact on their daily lives (Merikangas et al. 2009). Depression is one of the most common health problems among adolescents in Europe (Patel et al. 2007, European Union 2009), and its prevalence is approximately 4-6% (Thapar et al. 2012). Depression and anxiety are the most prevalent psychiatric disorders among adolescents (Marttunen & Karlsson 2010). In addition, the co-occurrence of anxiety disorders with depression is common (Beesdo et al. 2009). The prevalence of psychiatric disorders increases from late childhood to adolescence and young adulthood; those diagnosed with mental disorders at age 21 were double the figure at age 11 (Newman et al. 1996). The onset of psychiatric disorders before age 25 has been estimated to be about 75% and in mid-adolescence about 50% (Kessler et al, 2007, European Union 2009). According to the 1987 Finnish birth cohort study (N = 60, 069) which followed up subjects from 1987 until 2008 about 17% of males and 24% of females received some psychiatric care before becoming young adults. Medication for psychiatric disorders was prescribed for about 10% of males and 17% of females. Specialized psychiatric out-patient care was received by about 10% of males and 16% of females and inpatient care was received by about 5% of all. (Paananen et al. 2012.)

Depression extensively affects functional impairment and morbidity in adulthood (Weissman et al. 1999). Depression is related to adolescents' suicidal ideation and attempts (Pelkonen et al. 2011, Nock et al. 2013), and is connected to at least half of their suicides, which are the second most common cause of death among adolescents from age 15 to adults age 44 years (WHO 2013). According to a study of lifetime suicidal behaviour among adolescents in the United States, about 12% of adolescents experience suicidal ideation, 4% develop a suicide plan, and about 4% actually attempt suicide (Nock et al. 2013). In Finland, 20-25% of girls aged 13-16 years and 15% of boys have had suicidal ideations in the past year (Pelkonen et al. 2011). More than half of adolescents with major depression disorders had suicidal ideation, 28% had suicidal plans and 12% had attempted suicide (Sihvola et al. 2007). However, less than half of adolescents committing suicide had received psychiatric treatment (Pelkonen et al. 2011). Suicide rates among Finnish adolescents are the second

highest in the world. Three out of four suicides were males. (WHO 2012b.) In Finland in 2012, mortality due to suicide among population aged 0-17 per 100,000 persons was 1.2% and among those aged 18-24 it was 22,1% (National Institute for Health and Welfare 2013). In the long term, adolescents' suicide rates have declined in Finland (National Institute for Health and Welfare 2012). In general, the prognosis of adolescent depression is good in short term and most episodes respond to treatment. However, recurrences of depression are common, from 20% to 60% within first two years and 70% within five years. (Birmaher et al. 2002.)

Adolescents' mental health problems are undertreated globally (Herrman et al. 2012) and only 10-15% receive the needed treatment from health services (WHO 2005, Patel et al. 2007). Due to the prevalence and severity of adolescents' mental health problems and psychiatric disorders, evidence-based prevention and promotion strategies and interventions are needed in adolescent mental health care (Ministry of Social Affairs and Health 2009, Pelkonen et al. 2011, WHO 2013). Consequently, good mental well-being in adolescence has a crucial impact on mental well-being and performance in adulthood. Preventing depression and early treatment are important because mental health problems are one of the major single causes of disability globally (Carral et al. 2009, WHO 2013). Promoting adolescents' mental health has a significant future influence at many levels, such as educational achievement, psychosocial well-being, health, quality of life and work performance (European communities 2005, WHO 2012a).

The concept of adolescence is generally defined as a period of life between childhood and adulthood (Kaplan 2004). The developmental tasks of adolescence are biological, psychological and social. In general, adolescence is divided into three phases: early adolescence (ages 11-14), middle adolescence (ages 15-17) and late adolescence (ages 18-21). In adolescence, the developmental challenges are related to the achievement of biological and sexual maturation, the development of individual identity, the development of intimate sexual relationships with peers and the establishment of independence and autonomy. (Christie & Viner 2005.) In Finnish health services adolescence is defined to be between ages 13 and 22 (The Finnish Medical Society Duodecim 2010, Health Care Act 1326/2010). According to the Finnish Child Welfare Act (417/2007), a person under 18 years of age is a child and 18-20 years of age an adolescent besides the age of majority is 18 years.

2.1.2 Mental health services for adolescents

In Finland, adolescents' mental health care services are divided into primary health care and specialized medical care. Primary health care services are organized by municipalities and specialized medical care including outpatient and inpatient care is provided by hospital districts. In primary health care, school health care provides preventive mental health care services for adolescents. (Ministry of Social Affairs and Health 2013.) In Finland, Adolescent Psychiatry is an independent psychiatric speciality which is not known in other EU Member states. An independent psychiatric speciality for adolescents improved the care of adolescents with mental health problems and also their access to care (Pylkkänen 2013). Since 2006 the number of patients has increased by 60% in adolescent psychiatric out-patient care in Finland. In 2011, 2,354 adolescents aged 13-17 years received psychiatric specialist medical care. Depression was the main diagnosis in 30% of all adolescents aged 13-17 years. Of Finnish adolescents with depression, 77% were girls. Due to depression the number of adolescent outpatient clinic visits was 39,716 covering 4,500 patients. (National Institute for Health and Welfare 2013.) In Finland, the treatment of depressed adolescents at the outpatient clinics in specialized health care generally includes an evaluation phase, individual supportive therapy, family consultations and psychotropic medication if necessary (Pirkola et al. 2011).

The Plan for Mental Health and Substance Abuse Work (Mieli 2009) states that low-threshold, easy access services in basic public services are needed for adolescents. It emphasizes out-patient care and the equality of mental health care in Finland. (Ministry of Social Affairs and Health 2009.) When delivering mental health services for adolescents, it is important to ensure that services are age-appropriate and provided in developmentally suitable settings (HMG/DH 2011). Adolescent mental health services should be arranged in adolescents' daily living environment considering the needs of family members and ndeavor to ensure adolescents as normal a life as possible, at school and with their friends (Ministry of Social Affairs and Health 2009, HMG/DH 2011, Depression Current Care 2013). However, there is a lack of easy access mental health services and the quality of care is unequal in Finland (Ministry of Social Affairs and Health 2009). In spite of the seriousness and harmful effects of depression (Weissman et al. 1999), treatment is received many years after the onset of mental health disorders (Wang et al. 2007). One important reason for this may be the stigmatizing reputation of mental illness, which is still quite common. More than half of adolescents with mental health problems had experienced stigmatization in relationships with peers and almost half perceived stigmatization by family members e.g. distrust, avoidance, pity, and gossip, and about one third perceived stigma perpetrated by school staff e.g. avoidance and under-estimation of their skills (Moses 2010).

According to the literature it seems obvious that there still prevails a global lack of evidence-based treatment and easy access to care related to undertreatment of adolescents' mental health problems despite an awareness of the serious consequences. In Finland, there is a clear need for a national project which will focus on adolescents' mental health and especially depression. One way to strengthen adolescents' care of depression is to develop specific Depression Current Care for adolescents or national guideline.

2.1.3 Information technology in health care

Information technology (IT) in health care is usually defined as the involvement of computers and technology (Hersh 2009). In health care settings IT applications are used in information processing such as health related information data storage, searching and sharing (Brailer & Thompson 2004). eHealth is a commonly used term to refer broadly to all clinical telehealth acivities, such as information and education delivered through the Internet (Maheu et. al. 2005).

Finland is one of the top ten IT use countries in the world (International Telecommunications Union 2011). In Finland, the first national strategy for applying IT to health care was implemented in 1996 by the Ministry of Social Affairs and Health. It aimed at user-centred health care services and seamless service structures. (Hämäläinen et al. 2013.) The role of technology strengthened in health care services in the first ten years, but there was still a lack of user-centeredness; IT-based services and seamlessness were not implemented in practice (Hämäläinen & Hyppönen 2006). According to a recent evaluation by the OECD, the trends in the development of Finnish health care performance were not as good as might have been expected. In health care, the availability of services in particular is unequal. (OECD 2012.) One solution to improve the effectiveness and equality of health care services could be the utilization of the technology-based applications. eHealth can facilitate better care at lower costs within user-centred health care systems influencing positively the cost pressure on the public budgets for health care services (European Communities 2007). According to the national ICT 2015 working group report, more ICT-based services should be developed in public sector in Finland, because people are used to receiving electronic services (Ministry of Employment and the Economy 2013). The national eHealth and eWelfare plan emphasizes the implementation of nationwide online customer services in health care settings (Hämäläinen et al. 2013).

In recent decades IT has improved the quality, safety and effectiveness of patient care (Brailer & Thompson 2004). In Finland, IT usage is an essential part of daily nursing practice. Electronic patient records were used in 95% of the hospital districts and electronic nursing feedback and video consultation were used in almost half of them. However, only 14% of hospital districts used email with patients and 20% of health care centres, and no one had a high security system for exchanging information with patients by email. Text messages with patients were used by 20% of hospital districts and health care centres. (Winblad et al. 2012.) However, although patients are satisfied with the use of Internet-based communication in health care services, these have only slowly been integrated into clinical practice (Walwiener et al. 2009).

From the patient's point of view, information technology can offer faster and more flexible services. In Finland, Internet usage is very common in all age groups: 85% of the population aged 16 to 89 use the Internet for everyday matters, such as communication, information seeking, online purchasing, banking and media (OSF 2012). This trend provides a good basis for the use of various technology-based applications among patients. So far, patients can use electronic prescriptions (ePrescription) which has been adopted throughout Finland. Moreover, patients have access to their personal health records.

However, in Finland, the IT-based resources are rarely targeted directly at the general public. Only a few organizations used eHealth services (e.g. email, text-messaging, electronic appointment services) and only one third of the hospital districts used smartphones. Therefore there is also a lack of efficient IT-based self-help and home-delivered interventions. (Winblad et al. 2012.) During the last decade IT-based development has focused on electronic patient records, the exchange of electronic patient information between organizations (e.g. electronic consultations, electronic data exchange, eReferral and eDischarge Letters), the national ePrescription service and the national client information archive (Winblad et al. 2012, Hämäläinen et al. 2013). In 2011 the mean ICT-based costs in Finnish hospital districts were approximately 2.5% and in primary health care 2% of the total budget (Hämäläinen et al. 2013). In the future, IT and telecommunications have potential in offering new ways of working with people with mental health problems and different kinds of solutions will take many forms such as individual and group e-therapy and self-help programmes (Barak & Grohol 2011). To conclude, the development of IT could provide many new possibilities directly to health care customers. In Finland, it is perplexing to realize how little IT-solutions have been utilized so far to improve health care services from the customers' point of view. In future, it is obvious that health care customers will be demanding more direct IT-based services.

2.1.4 Information technology in mental health care

IT can provide potential benefits and flexible choices for mental health care. It can facilitate better accessibility making treatment more readily available. In addition, IT may be to reach people suffering from mental health problems, especially those who receive no treatment at all. (Maheu et al. 2005.) Technology-based interventions can remove the barriers associated with face-to-face interventions (Bee et al. 2008) offering a less stigmatizing way of seeking help for mental health problems (HMG/DH 2011). In the UK the national recommendations call for the technology-delivered psychological treatment of depression and anxiety disorders as well as face-to-face treatment improving access to psychotherapy interventions (Clark 2011). Moreover, service users' participation could be enhanced through technology-based applications in mental health care (Ministry of Social Affairs and Health 2009, Barak & Grohol 2011, Ennis et al., 2011, Ministry of Employment and the Economy 2013).

Internet can offer various opportunities to extend services in mental health care. Barak and Grohol (2011) identified five categories in Internet-based mental health services: Online counseling and psychotherapy, e.g. Internet-based patient-therapist psychotherapeutic interactions; psychoeducational websites, e.g. informational sites without personal contact; Interactive self-guided interventions, e.g. structured Internet-based self-help programme; Online support groups and blogs, e.g. peer-focused support groups available on Facebook or Twitter; and other types of online interventions e.g. smart phone applications or virtual worlds interventions such as Second Life. In general, self-guided interventions are based on psychoeducation, cognitive-bahavioural and interpersonal therapy theories including six to ten sessions lasting from half an hour to an hour (Kaltenhaler et al. 2006, Spek et al. 2007, Barak & Grohol 2011).

Reviews (Griffiths & Christensen 2006, Kaltenhaler et al. 2006, Barak & Grohol 2011, Slone et al. 2012) and meta-analyses (Bee et al. 2008) of IT-based interventions and self-help treatments for mental health problems have produced convincing shown evidence. Australian MoodGYM is a public, self-guided, Internet-based treatment programme for preventing and treating depression. MoodGYM has achieved a reduction in depression and anxiety disorders. The six-week programme includes five 20- to 40-minute modules and an online workbook (e.g. exercises in cognitive restructuring, depression and anxiety assessment, self-esteem and problem solving training) and a feedback assessment tool. (Griffiths & Christensen 2006.) About 600,000 users have registered for MoodGYM. It has been translated into Dutch, Norwegian, Finnish and Chinese, and its use is free (Centre for Mental Health Research 2013). In the UK, the Internet-based Beating the Blues programme is intended for people suffering from depression disorders. The programme includes eight weekly sessions lasting 50 minutes, and physicians prescribe it in primary health care. (Cavanagh et al. 2006.) It is free to use for approximately 70% of UK inhabitants (Barak & Grohol 2011).

Extensive evidence has proved that especially cognitive behavioural therapy (CBT) delivered through IT-based applications (e.g. Internet, smart phone, telephone) is effective and feasible in mental health services (Kaltenhaler et al. 2006, Spek et al. 2007, Richardson et al. 2010, Barak & Grohol 2011). Telephone delivered CBT is as effective as face-to-face treatment for the majority of patients (Lovell et al. 2006, Hammond et al. 2012) but for patients with more severe psychiatric disorders, where convenient, face-to-face CBT was superior (Hammond et al. 2012). CBT delivered by telephone decreased treatment time by 40%, which has obvious economic implications. In addition, patients were equally satisfied with their treatment as with face-to-face treatment. (Lovell et al. 2006.) In future, smart phone applications especially will offer various opportunities in mental health care (Barack & Grohol 2011, Hammond et al. 2012, Pinto et al. 2013) shortening the duration of treatment time (Lovell et al. 2006), lowering the threshold for seeking treatment (Mohr et al. 2006) and increasing equality of access to treatment (HMG/DH 2011). Further, the use of IT-based CBT is supported by the facts that adherence rates are high and patients are satisfied despite the significantly reduced amount of contact with the therapists (Kaltenhaler et al. 2006). There is also evidence that people with stigmatizing illnesses, such as mental health disorders, prefer to seek health information on the Internet (Berger et al. 2005).

IT-based applications are a potentially useful and effective method to reach and support adolescents with mental health problems (Slone et al. 2012). From the adolescents' point of view, IT-based applications are an integral part of young people's lives. In Finland, 100% of young people aged 16-24 had used the Internet in the past three months, 80% of them used the Internet daily several times, and 64% owned smartphones (OSF 2012). The Internet is an essential mental health information source among adolescents (Skinner et al. 2003, Horgan & Sweeney 2010, Nelson & Bui 2010) especially among adolescents who lack alternatives and who have no one to ask about privacy-

related health issues (Mitchell et al. 2013). Moreover, adolescents recommend Internet-based mental health services to their friends (Kauer et al. 2014). Internet has a positive impact in adolescent daily life. Lee (2009) found that adolescents, who used of social media a great deal, had had extensive networks of friends since childhood. By contrast, for those adolescents without friends, Internet may provide an opportunity to communicate with other young people. (Lee 2009.) There is also evidence that online chatting could improve adolescents' wellbeing and alleviate perceived emotional distress (Fukkink & Hermanns 2009). Technology-based new applications will make a desirable contribution to current service development and are highly suitable for adolescents' mental health care (Nelson & Bui 2010, Herrman et al. 2012). However, according to two systematic reviews, the use of technology-based applications in adolescent mental health care services is still much less common than among adults (Kaltenhaler et al. 2006, Calear & Christensen 2010).

IT-based applications for adolescents in mental health services can be divided into videoconferencing (VC), telephone and Internet delivered services targeting individuals or groups (Slone et al. 2012). VC interventions for adolescents have been used for emotional distress and depression (Nelson et al. 2003), family distress (Glueckauf et al. 2002) and psychiatric consultation (Yellowlees et al. 2008). Eight-week, VC administered CBT for treatment of adolescents with depression showed an improvement in depressive disorders and required even fewer sessions than in face-to-face intervention (Nelson et al. 2003). VC intervention for family distress showed an improvement in problem severity and reduction of family distress. Moreover, the adherence rate for the VC intervention was high and there were no differences compared to face-to-face intervention, which indicated that the relationship with therapist is not impaired due to the use of technology. (Glueckauf et al. 2002.) However, the sample sizes of the VC studies were small and VC interventions had been used more among rural populations, which could be connected to easy access to treatment (Slone et al. 2012). Telephone-based interventions for adolescents have been developed for depression (Logsdon et al. 2010, Kauer et al. 2012), suicidality (King et.al 2003), emotional distress (King et al. 2006) and obsessive compulsive disorders (Turner at al. 2009). A depression programme delivered via telephone was delivered to teenage mothers who delivered a child within the previous month and who had depressive disorders. The results showed improvements in depression disorders after 3-month follow-up, but this did not continue after 6-month follow-up (Logsdon et al. 2010). An Australian research group's findings indicated that a 40-minute telephone session was effective in reducing suicidal ideations and improving the mental health status of children and adolescents who called the Kids Help Line (King et al. 2003).

According to a systematic review, adolescents' Internet-based programmes have been designed for the prevention or care of depression, anxiety or stress, emotional distress, eating disorders, alcohol and drug abuse and smoking cessation (Slone et al. 2012). Despite the promising evidence of the effectiveness of the Internet-based support systems for adults with depression disorders (Griffiths & Christensen 2006, Kaltenhaler et al. 2006, Spek et al. 2007, Bee et al. 2008), only a few systems could be found for adolescents with depression disorders (Calear & Christensen 2010, Slone et al. 2012). An Australian six-week CBT-based MoodGYM programme has been delivered in the school settings in a health course (O'Kearney et al. 2006, Calear et al. 2009). MoodGYM in the school setting achieved significant reductions in anxiety disorders and depression only for boys (Calear et al. 2009), but an earlier study found noreductions in depression disorders (O'Kearney et al. 2006). A German online stress prevention programme which included eight education sessions and exercises both in the school and home settings found that adolescents who completed the programme at school derived the greatest benefit and reported higher adherence (Fridrici & Lohaus 2009).

Promising research evidence of IT-based programmes among adults in mental health services encourages development and implementation of new IT-based solutions among adolescents. Despite

a strong IT breakthrough there are still remarkably few evidence-based IT-solutions for adolescents in mental health care services. One reason might be that adolescents are underage and it poses different ethical challenges regarding responsibility issues in case of young persons and minors. In future, IT-based group programmes giving peer support will be more readily available to provide more equal possibilities to access care. Moreover, IT-based solutions could build up user involvement for persons suffering from mental health problems as their communications opportunities are facilitated.

2.1.5 Nurses' use and acceptance of information technology

Nurses' acceptance of a new technology system is a crucial aspect that needs to be considered to ensure successful implementation (Gagnon et al. 2009). According to the literature, various factors could be associated with the acceptance of IT (Holden & Karsh 2010). The commitments of health care personnel to using IT can be facilitated when it promotes the effectiveness and quality of care (Zwaanswijk et al. 2011). Individual characteristics such as nurses' IT skills, role in health care and positive experiences are connected with the later use and acceptance of IT. The perception of using IT on a voluntary basis is conducive to acceptance by personnel. A supportive organizational culture for change and providing IT support promote IT acceptance in the health care setting. (Li et al. 2013.) Organizational infrastructure is an important facilitator and continuing training should be provided (Gagnon et al. 2009). In addition, a positive team climate may affect IT acceptance among health care personnel (Koivunen et al. 2014). The successful implementation of IT necessitates an implementation plan (Klein & Knight 2005) which includes organizational support (de Veer et al. 2011) and IT support before, during and after the introduction of a new technology application (Li et al. 2013).

Nurses' acceptance and use of IT could be promoted by identifying impeding factors. Barriers to using technology in nursing practice are associated with nurses' poor computer skills (Koivunen et al. 2008b, Gagnon et al. 2009, Li et al. 2013), negative attitudes towards technology use (Nilson et al. 2008, Wilkinson et al. 2008, de Veer & Francke 2010, Koivunen et al. 2010, Takian et al. 2012), legal concerns, time consumption, complexity of technology (Li et al. 2013) and a lack of organizational support (Klein & Knight 2005, Burton-Jones & Hubona 2006, Yarbrough & Smith 2007, Koivunen et al. 2008a, Li et al. 2013). The concept of computer anxiety has been identified among nurses and it is defined as emotional reactions, including nervousness and anxiety, towards computer use (Ketikidis et al. 2012, Li et al. 2013). In addition, nurses' anxiety related to computers may cause them to avoid using computers (Wilkinsson et al. 2008). However, computer anxiety does not predict nurses' and medical doctors' health information technology use intentions and computer use is not perceived as a stressful working task (Ketikidis et al. 2012). Nurses may have difficulties identifying IT use in nursing practice and they may prefer face-to-face care (Nilson et al. 2008).

In the field of mental health nursing a rapid technology reform has been identified (Maheu et al. 2005, Barak & Grohol 2011). Nurses need a new competence to manage this expanding demand which technology adoption inevitably means. Nurses working in the field of mental health should therefore be provided with the appropriate education and training to support their technology usage. (Koivunen et al. 2008b, Anttila et al. 2011.) Despite promising evidence of IT-based interventions (Griffiths & Christensen 2006, Kaltenhaler et al. 2006, Bee et al. 2008, Barak & Grohol 2011, Slone et al. 2012), some sceptical views on technology-based applications still persist among mental health professionals and they prefer convenient face-to-face care or therapy (Maheu et al. 2005, Schwarzman et al. 2012). One solution to reduce nurses' resistance and promote their acceptance is to highlight the benefits of technology in daily practice and patient care (de Veer & Francke 2010, Li

et al. 2013). When implementing any kind of IT-based application in mental health nursing the risk management issues should be taken into account by the organization. First, professional training and supervision support the acceptance of a new technology among nursing staff. Second, security (e.g. confidentiality and safeguarding privacy) and legal issues should be resolved. Third, ethical challenges should be identified including reasonable risk assessment connected with technology. (Maheu et al. 2005.)

It is important to understand why nursing staff accept or reject the IT in clinical practice. Various theories of information technology have been developed to predict and explain IT acceptance and use. (Holden & Karsh 2010.) First, Innovation Diffusion Theory (IDT) seeks to explain the adoption of technology through the process of social change and how innovation spreads. Adoption refers to the use of an innovation and users can be classified into laggards, late majority, early majority, early adopters and innovators. (Rogers 2003.) Second, the Theory of Planned Behavior (TPB) suggests that the main determinants of an individual's behavioural intention to use technology are attitudes toward technology, subjective norms and behavioural control. Moreover, behavioural beliefs, normative beliefs and control beliefs exert influence through the main determinants of an individual's behavioural intention to use technology. (Ajzen 2002.) Third, the Unified Theory of Acceptance and Use of Technology (UTAUT) explains an individual's behavioural intention to use technology and actual use. The main determinants of the intention to use technology are performance expectancy, effort expectancy, social influence and facilitating conditions. (Venkatetesh et al. 2003.) Fourth, the FITT framework defines three key elements which influence technology adoption: the fit between individual, task and technology (Ammenwerth et al. 2006). Finally, the Technology Acceptance Model (TAM) explains and predicts how individuals come to accept and use technology (Davis 1989, Davis et al. 1989). TAM predicts an individual's later acceptance of technology by two major beliefs: perceived usefulness (PU) and perceived ease of use (PEOU) (Davis 1989). TAM2 is modified from the original TAM theory. TAM2 removed lacks the attitude component but a subjective norms component has been added to it (Venkatesh & Davis 2000).

In this study, the focus is on nurses' acceptance of IT and individuals' perspectives. Nurses' acceptance of IT is important when developing a new intervention and before its implementation. Nurses have a critical role within psychiatric care to either adopt or reject a new technology-based solution in patient care. A better understanding of the factors related to IT acceptance is expected to facilitate later successful implementations of the support system. TAM experiences will be selected to structure the different research phases and to enhance the understanding of nurses' acceptance of the Internet-based support system and the implementation process. TAM was chosen because it has strong evidence in different health care settings explaining the health care staff's reactions to IT (Holden & Karsh 2010). Moreover, TAM is a useful model to identify and explain both individual factors (e.g. attitudes, individual believes of perceived usefulness and ease of use) and different external factors (e.g. recourses, functionality of IT, training). However, according to the review of Holden and Karsh (2010) TAM would benefit from improvements, especially from the perspective of end-user acceptance. Also, the rapid development of interactional digital communication would have to be taken into account.

2.2 The theory of Technology Acceptance Model (TAM)

TAM was developed in the 1980s and is the most widely used theoretical model in IT research (Chutter 2009), with evidence from various health care studies (Venkatesh & Davis 2000, Lee et al. 2003, King & He 2006, Holden & Karsh 2010). The theoretical framework of TAM is based on the Theory of Reasoned Action (TRA) developed by Fishbein and Ajzen (1975). TRA is a very general

model from social psychology which is especially suitable for predicting and explaining individuals' behaviour in a number of different domains (Ajzen & Fishbein 1980). According to TRA an individual's actual behaviour can be defined by considering that individual's prior intention along with the beliefs that he or she has regarding the given behaviour. TRA proposes that an individual's behavioural intention depends on that individual's attitude regarding the actual behaviour and subjective norms associated with the behaviour in question. (Fishbein & Ajzen 1975.) TAM is an adaptation of TRA focused on user acceptance of information technology systems (Davis 1989). TAM has been modified several times (Chutter 2009, Holden & Karsh 2010), and related theories include TAM2 (Venkatesh & Davis 2000), UTAUT (Venkatetesh et al. 2002), and TPB (Ajzen 2002).

The Technology Acceptance Model predicts users' later acceptance of a given technology by two major beliefs: perceived usefulness (PU) and perceived ease of use (PEOU) (Davis 1989). According to TAM, individuals' behavioural intention to use a certain technology is determined directly by their attitudes and PU. In turn PEOU influences PU and attitudes. PEOU influences behavioural intention (BI) indirectly through both the PU and attitudinal constructs. An individual's BI is seen as the last phase of TAM, which predicts later actual system use. External variables may have impact on PEOU and PU, and these variables include organizational and social variables, and also features of the technology system (Figure 1). (Davis et al. 1989.)

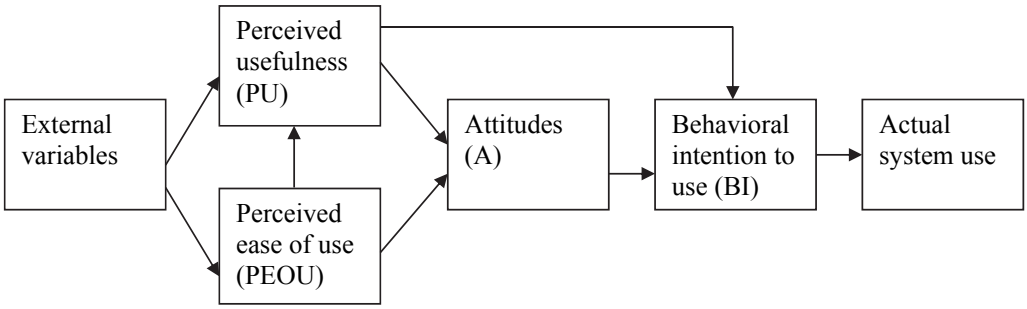

Figure 1. Technology Acceptance Model (TAM) by Davis, Bagozzi and Warshaw (1989)

Perceived usefulness (PU) is defined as the degree to which an individual believes that using a specific technology system could have a positive impact on his or her work performance (Davis 1989). Davis et al. (1989) claimed that PU is a major determinant of an individual's intention to use a computer. Davis (1989) refined six attributes for PU, namely: 1) accomplish tasks more quickly, 2) improve job performance, 3) improve productivity, 4) enhance effectiveness on the job, 5) make easier to do the job and 6) find technology useful in the job. Perceived usefulness has a stronger relationship to the user acceptance of a technology than does perceived ease of use (Davis 1989).

Perceived ease of use (PEOU) is defined as the degree to which an individual believes that using a specific technology system is free from physical or mental effort (Davis 1989, Holden & Karsh 2010). In other words, the utilization of the new technology should be reasonably effortless (Davis et al. 1989). Davis (1989) refined six attributes for PEOU, namely: 1) easy to learn to operate the system, 2) easy to get the system to do what one wants, 3) interaction with the system is clear and understandable, 4) the system is flexible to interact with, 5) easy to become skillful with system and 6) easy to use.

Behavioural intention (BI) to use system is defined an individual's motivation or willingness to use effort to perform the target behaviour (Davis et al. 1989, Holden & Karsh 2010). BI is determined by an individual's attitudes towards using the technology system and PU. Finally, an individual's actual system use determines that user's technology acceptance. (Davis et al. 1989.)

Attitude can be defined as the perception by an individual of the positive or negative consequences of adopting the technology (Rogers 2003). Burkes (1991) defined attitudes towards computer use in nursing practice on three dimensions: beliefs, satisfaction with using a computer and motivation to use a computer. The attitudinal part of TAM measures an individual's affective response to adopting a new technology-based application (Davis et al. 1989). The external variables of TAM refer to user characteristics, system features, user training and user participation in the design and implementation process (Davis et al. 1989, Venkatesh & Davis 2000).

In this study perceived usefulness is defined as nurses' beliefs that using the Internet-based support system would enhance their work performance in the adolescent psychiatric out-patient care. In addition, in health care studies PU is defined as improved care and better quality of work (Karsh & Holden 2010). Nurses' perspectives of improved care and better quality of work are described as the benefits and facilitators of the Internet-based support system in adolescent psychiatric out-patient care. Karsh and Holden (2010) have suggested that in health care studies of TAM the context should be defined as widely as possible. McGovan et al. (2012) defined user's perceived barriers as the individual factors of TAM. Therefore non-perceived usefulness is also described by the disadvantages and barriers of the Internet-based support system. Nurses' perceived ease of use is defined by Davis (1989) as clear and understandable interaction with the computer and Internet, and ease in using it in daily practice in adolescent psychiatric out-patient care. PEOU is measured by exploring nurses' computer and Internet use in daily nursing practice and the problems they face in it. External variables are determined as the nurses' characteristics, such as computer skills, the features of the Internet-based support system, and nurses' training and their participation in the development and implementation process of the Internet-based support system (Davis et al. 1989, Venkatesh & Davis 1996). The beliefs, satisfaction with using computers and motivation to use computers are used in this study for measuring nurses' attitudes in adolescent psychiatric out-patient nursing practice (Burkes 1991). Behavioural intention to use is defined as the nurses' intention to use the Internet-based support system in psychiatric out-patient care. Actual system use is measured by exploring nurses' perceived benefits and disadvantages of the Internet-based support system, and facilitators and barriers associated with successful implementation of the support system after one year's use.

2.2.1 The Technology Acceptance Model in health care

The Technology Acceptance Model was not developed specifically for the needs of health care, but has been used in a number of studies to predict and explain health information technology acceptance and use (Holden & Karsh 2010). In the context of healthcare TAM is a good predictive model for the acceptance of technology use (Gagnon et al. 2009) but it may benefit from several additions (Holden & Karsh 2010). Chau and Hu (2001) tested TAM in predicting physicians' acceptance of telemedicine technology and found that it was a suitable model to describe physicians' acceptance of technology but TAM should be modified especially to suit the health care context.

2.2.2 Perceived usefulness

In many health care studies perceived usefulness has been found to be a significant predictor of system usage when compared to perceived ease of use (Burton-Jones & Hubona 2006, King & He 2006, Holden & Karsh 2010). According to the literature review by Holden and Karsh (2010) perceived usefulness is determined in health care studies as quicker task completion, easier work, better quality of care or quality of work, easier work process, improved effectiveness, better evidence-based decisions, greater control over work, outcomes of care, such as improved patient care, and more accurate and objective performance in working tasks. Vassar et al. (1999) proposed perceived usefulness to include features associated with the information system itself, the users, the task processes and other environmental features. McGovan et al. (2012) used TAM as a theoretical framework when studying physicians' use of social media. They extended the model and used perceived barriers as an individual factor. The study showed that while the physicians' perceived barriers were high they still used social media. (McGovan et al. 2012.)

Some health care studies have shown that there is no relationship between perceived usefulness and ease of use (Chau & Hu 2001, Holden & Karsh 2010). Moreover, the meta-analysis of TAM showed that the influence of perceived usefulness on behavioural intention is wide, but the direct relationship between perceived ease of use and behavioural intention to use is variable (King & He 2006). Shen et al. (2006) studied social influence with regard to the perceived usefulness of an online course delivery system and found that teachers' and mentors' (teaching assistant, who provided support online, telephone and face-to-face) influences were significant contributors to students' perceived usefulness of the online course. In an online learning environment the mentor who provides support to students e.g. on how to use the system and solve technical problems, could influence students' perceived ease of use (Shen et al. 2006).

2.2.3 Perceived ease of use

In health care studies perceived ease of use is defined as a system requiring low mental effort, easy to do tasks when using the system, easy navigation, tasks are easy to remember and system is not demanding of much care and attention (Holden & Karsh 2010). In health care studies especially the relationship between perceived ease of use and behavioural intention to use has been controversial (Lee et al. 2003). According to Ketikidis et al. (2012) perceived ease of use, but not usefulness significantly directly predicted health information technology behavioural intention to use among nurses and medical doctors. King and He (2006) found that in an Internet-based technology application perceived ease of use directly influenced users' behavioural intention to use. The findings differed from those of earlier studies reporting perceived usefulness as the strongest predictor of TAM in health care settings (Burton-Jones & Hubona 2006, King & He 2006, Holden & Karsh 2010). Perceived ease of use in training before the use of a technology application may be an important factor in future compliance (Wade et al. 2012). In a telehealth study on older people pre-usage perceived ease of use was connected with future compliance (Wade et al. 2012). Moreover, perceived ease of use may increase if the users discover after usage that the technology equipment is easier to use than expected (Huis et al. 2010, Wade et al. 2012).

2.2.4 Attitudes towards technology

According to health care studies using TAM attitudes are defined as an individual's evaluative judgment of the target behaviour on a dichotomous dimension, such as beneficial or harmful (Karsh & Holden 2010). Nurses' positive attitudes towards technology use were determined by previous experiences with technology and their perceived usefulness, which is connected to quality of care when using electronic patient records in a psychiatric organization (de Veer & Francke 2010). In psychiatric acute care it was suggested that nurses' positive attitudes towards the use of technology-based applications may be influenced by a favourable team climate. Positive attitudes, in turn, may promote nurses' motivation to use technology. (Koivunen et al. 2014.) On the other hand, when nurses' attitudes were at a neutral level before the implementation of the IT-based application in psychiatric care, their attitudes did not change in favour of computer and Internet use after the implementation of a new IT intervention (Koivunen et al. 2010).

2.2.5 External variables

Different kinds of external variables should be taken into account both in the process of developing the technology-based intervention and in the implementation process. External variables can be related to the individual level (e.g. IT knowledge and staff turnover), the task level (e.g. changes in the tasks, increasingly time consuming and complex tasks), organizational level (e.g. provision of support and training, resources, commitment of management and strategy of hospital) and the technology-based intervention level (e.g. functionality and IT support). (Asua et al. 2012.) It is important to evaluate the indirect impact of external variables on behavioural intention to accept technology (Lee et al. 2003, Burton-Jones & Hubona 2006). Users' individual characteristics, such as age, education level and experience may have a direct or indirect influence on the perceived usefulness and ease of use of a technology system. Thus, in the process of implementing a new technology, managers should take account of these individual differences and provide training and support which should be tailored to the needs of users (Burton-Jones & Hubona 2006). Nurses' tailored training (e.g. computer skills and system use) was found to be an important external variable in the implementation of a technology-based patient education programme in psychiatric wards (Anttila et al. 2011). It has been argued that a limitation of the TAM is its incapacity to take account of the effect of external variables on technology acceptance, which reduces the accuracy of the model (Yarbrough & Smith 2007).

2.2.6 Behavioural intention

In understanding individuals' technology acceptance the concept of behavioural intention is essential. It refers to human behaviour, to how people react to a new technology in practice and how successful the implementation has been in the health care setting. (Ketikidis et al. 2012.) An individual's motivation or willingness to use technology may be connected with other people's approval or disapproval of technology usage (Holden & Karsh 2010). Further, the organizational culture may foster an individual's intention to use a new technology (Ketikidis et al. 2012). Behavioural intention is in some cases the only measured outcome in health care studies using TAM. This is because behavioural intention is reliable in predicting actual use and because actual system use is difficult to measure. (Holden & Karsh 2010, Ketikidis et al. 2012.) Organizational factors as the facilitators (e.g. technical support and training) could be significant variables to consider health care staff's behavioural intention to use a new technology (Asua et al. 2012). According to a meta-analysis of TAM, perceived usefulness has a significant impact on behavioural intention, decreasing

the influence of perceived ease of use. However, there is one exception, namely Internet-based applications when perceived ease of use influences behavioural intention directly and significantly. (King & He 2006.)

2.2.7 Actual system use

Health care staff's actual system use and acceptance of a new technology may be influenced by careful planning, staff involvement , the functionality of the technology itself (de Veer et al. 2011) and information about IT support (Engström et al. 2009) before the implementation. Ketikidis et al. (2012) found that there was no significant difference between nurses and physicians in health technology acceptance. According to a review by Yarbrough and Smith (2007) the barriers to physician technology acceptance were connected with time, organization, personal issues and technology related factors. Similar findings has been reported among nurses, when the most common barrier to the actual use of new technology was the technology and organizational factors, such as dysfunction of the technology and lack of training and coaching (de Veer et al. 2011). The evidence that a new technology increases productivity or quality of care may have a positive influence on health care personnel's technology adoption and actual system use (Yarbrough & Smith 2007, de Veer et al. 2011). A study on the implementation of a home telehealth programme by older adults and their carers showed that perceived usefulness and ease of use predicted acceptance of the programme and future usage compliance (Wade et al. 2012).

To sum up the acceptance of a new technology: First, external variables such as technology training and technology skills may affect individuals' beliefs about using a new technology system. Second, individual's beliefs affect their attitudes to using a technology system. Third, individual's attitudes influence behavioural intention to use the technology system and finally, individual's behavioural intentions determine the level of usage of the technology system as actual system use and acceptance of the new technology. (Davis et al. 1989, Venkatesh & Davis 1996, Burton-Jones & Hubona 2006, Holden & Karsh 2010.) In addiction, the barriers to the acceptance and integration of technology-based innovations in mental health services may be related to resistance from middle management and the complexity of the innovation (Brooks et al. 2011).

3. AIMS OF THE STUDY

In Phases I and II, the aim of this study is to describe the perceived usefulness of an Internet-based support system, and perceived ease of computer and Internet use and attitudes towards it from the nurses' perspective (Pre-study phase; before the development of the Internet-based support system). In Phase III the aim is to describe the external variables of the support system and its implementation (Development phase). In Phase IV, after the implementation of the support system nurses' behavioural intention to use and actual use of the support system with depressed adolescents in psychiatric out-patient care are described (Post-study phase; after the development and implementation of the Internet-based support system).

PHASE I:
Nurses' perceptions of the perceived usefulness of the Internet-based support system in adolescent psychiatric out-patient care of adolescents with depression

1. What kind of benefits and facilitators do the nurses perceive regarding the Internet-based support system in adolescent psychiatric out-patient care?
2. What kind of disadvantages and barriers do the nurses perceive regarding the Internet-based support system in adolescent psychiatric out-patient care of adolescents with depression?

PHASE II:
Nurses' perceived ease of computer and Internet use and attitudes toward it in adolescent psychiatric out-patient nursing practice

1. What are the nurses' experiences of their computer and Internet use and problems they face in daily nursing practice in adolescent psychiatric out-patient care?
2. What are the nurses' attitudes towards computer use in adolescent psychiatric out-patient nursing practice?

PHASE III:
Nurses' characteristics, features of the Internet-based support system and its implementation process in adolescent psychiatric out-patient care as external variables

1. What are the nurses' computer skills?
2. What is the Internet-based support system developed for adolescents with depression like?
3. How is the Internet-based support system implemented for use in adolescent psychiatric out-patient care?

PHASE IV
Nurses' experiences of behavioural intention and actual Internet-based support system use for adolescents with depressive disorders in psychiatric out-patient care after one year's use

1. What kind of benefits and possible disadvantages do nurses describe regarding the Internet-based support system?
2. What kind of facilitators and barriers do nurses describe regarding the implementation of the Internet-based support system?

The study includes four different phases (Phases I – IV), as in TAM (Davis et al. 1989). In Phase I, nurses' perceived usefulness of the Internet-based support system was explored. In Phase II, nurses' perceived ease of computer and Internet use and attitudes toward it in nursing practice were explored. Phases I and II were conducted before the introduction of the Internet-based support system. The nurses were informed that their organization has agreed to participate in a study project which will develop an Internet-based support system for adolescents with depression in the out-patient care context. This meant that nurses had to reflect expectations regarding to IT-based support system in general, because there was no experience of a support system at that time. In Phase III, based on the external variables of TAM, the features of the Internet-based support system and implementation plan were described. Moreover, nurses' computer skills were evaluated. In Phase IV, nurses' behavioural intention and actual Internet-based support system use were described after one year's use. The study phases, topics and the papers of the study are summarized in Figure 2.

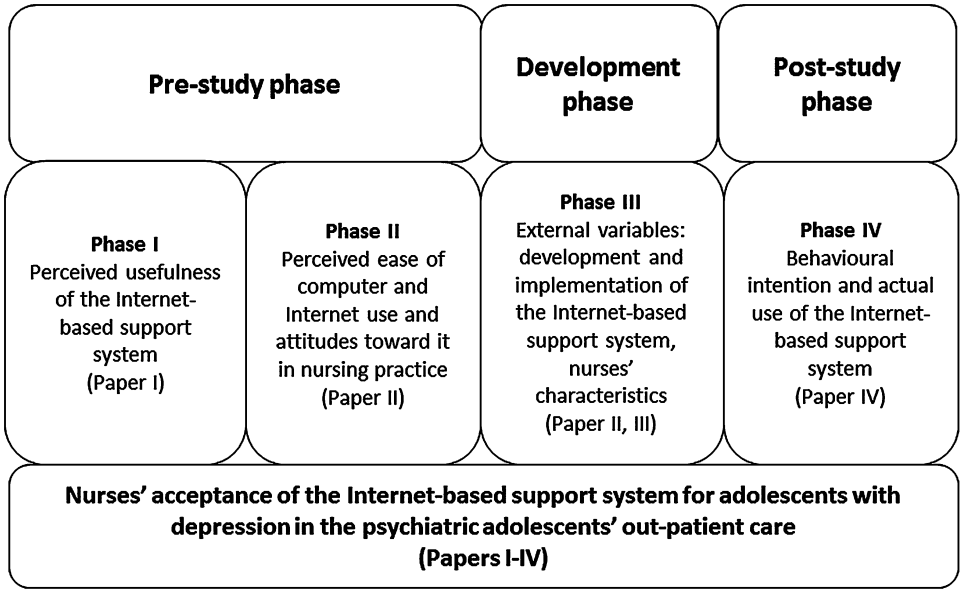

Figure 2. Study phases and summary

4. METHODOLOGY

4.1 Theoretical approach of the study

In this study TAM (Davis et al. 1989) was used as a theoretical approach. First, nurses' perceptions of the perceived usefulness of the Internet-based support system in adolescent psychiatric out-patient care of adolescents with depression are described. In addition, nurses' perceived non-usefulness is reported to reinforce information about all the factors affecting the use of this system and its successful implementation. Perceived usefulness was approached from the perspective of the benefits and facilitators of the support system, and in contrast perceived disadvantages and barriers. (Paper I.) Secondly, nurses' perceived ease of computer and Internet use and attitudes towards it are described (Paper II). Thirdly, according to TAM external variables are reported from the perspectives of nurses' characteristics, the features of the support system developed and the process of its implementation (Papers II, III). Last, nurses' behavioural intention and actual support system use are reported after one year system using experiences (Paper IV).

4.2 Methodological approach of the study

The perceived usefulness of the Internet-based support system, the perceived ease of computer and Internet use and attitudes towards it, external variables of the support system and its implementation and the nurses' behavioural intention and actual use of the support system for adolescents with depression were studied using mixed methods, which involves both qualitative and quantitative methods (Polit & Beck 2010). In phase I, nurses' experiences of the perceived usefulness of the Internet-based support system were explored before its development process. A holistic approach with qualitative methods was needed when exploring a little-known phenomenon (Scott-Tilley 2007). In Phase II, nurses' computer and Internet use, the problems they faced in clinical practice and attitudes towards the Internet were explored in psychiatric out-patient care. In Phase III, features of the Internet-based support system and implementation plan were described. In Phases II and III, a combination of qualitative and quantitative methods provided different data needed to solve a complex research problem and add wider perspectives to the phenomenon under investigation. The mixed methods approach was intended to yield deeper insight and understanding about the subject studied than if either dataset had been used alone. (Long & Boswell 2007.) In Phase IV nurses' behavioural intention and actual use of the support system were described after they had one year's experience of using the system.

4.3 Study design

In **Phase I,** an explorative study design with qualitative methods was used to achieve an understanding of nurses' perceptions regarding the usefulness of the Internet-based support system in out-patient care among depressed adolescents. Therefore, qualitative research design with a holistic and flexible approach was well-suited for exploring the nature of little-understood phenomenon such as nurses' perceptions of the usefulness of the support system in psychiatric nursing practice (Polit & Beck 2010). The information that the Phase I provided was important from the point of view of development and implementation plan for the support system. In addition, the qualitative approaches provided insight from the participants' perspective within their own context.

In **Phase II**, mixed methods were used. A quantitative method was used to ascertain nurses' attitudes toward computer and Internet use in adolescent psychiatric out-patient nursing practice. Nurses' attitudes toward computer and Internet use were measured in general, because this information was necessary to exclude the impact of their negative attitudes resulting in rejecting the use of upcoming IT-based support system. A qualitative method was likewise used to explore nurses' experiences regarding their daily computer and Internet use and the problems they faced in daily nursing practice in adolescent psychiatric out-patient care. The information so obtained was valuable in identifying possible barriers to successful implementation of the Internet-based support system.

In **Phase III,** mixed methods were used. A quantitative method was used to measure nurses' computer skills. This was done to confirm that external variables such as computer skills would facilitate the implementation of the Internet-based support system. Computer skills were explored on a general level only, for the reason that a support system was not yet ready. As a part of the development of the support system the experiences of professionals working with adolescents were explored with a qualitative method. In this phase the content and features of the support system and implementation plan were described.

In **Phase IV,** a descriptive study design with a qualitative method was used. After one year's use of the Internet-based support system the nurses' experiences of using the support system were explored. The information obtained was used to reflect the nurses' behavioural intention and actual use of the Internet-based support system.

4.4 Study setting, population and sampling

The study was conducted in the adolescent psychiatry departments' outpatient clinics of two university central hospitals in southern Finland. These clinics offer specialized outpatient treatment for adolescents aged 13 to 17 years. The treatment usually includes an examination and a diagnostic assessment period, and a treatment period by a multidisciplinary team (nurses, psychologists, social workers, physicians and occupational therapists). (Papers I, II, III, IV.) The Internet-based support system was developed at the University of Tampere (Paper III). Prior to the development of the Internet-based support system a study was conducted in basic public services of one municipality – a self-government unit. The concept of basic public services in the Finnish context includes e.g. local level education, youth services, primary health care services, social services and student health and welfare services. (Ministry of Finance 2014). (Paper III.)

In **Phases I, II** and **III** purposive sampling methods were used to select five specialized adolescents' out-patient clinics from two university central hospitals. The sample included nurses who were working in these out-patient clinics. The respondents were nurses (N = 14) who were willing to participate in the developing process of the Internet-based support system and later use it. All these nurses were registered nurses, and they all had had additional specialized training in mental health nursing. (Papers I and II.) In addition, in Phase III purposive sampling methods were used to contact professionals (N = 7) working with adolescents in basic public services. Purposive sampling involved the conscious selection of professionals whose working experience was with adolescents, so as to make sure that the selected professionals will have certain characteristics pertinent to the study. In **Phase IV** all registered nurses (N = 9) who had used the Internet-based support system in the study clinics formed the study population and were recruited in the study. Purposive sampling methods were used to contact those nurses who were working in these two outpatient clinics. Thus the population consisted of registered nurses (N = 9) who have used the Internet-based support system. (Paper IV.)

Table 1. Setting, population and sampling method in different phases of the study

Phase	Setting	Populations	Sampling method
I	Out-patient clinics of two university central hospitals at the Department of Adolescent Psychiatry in Southern Finland	Registered nurses	Purposive sampling methods
II	Out-patient clinics of two university central hospitals at the Department of Adolescent Psychiatry in Southern Finland	Registered nurses	Purposive sampling methods
III	Out-patient clinics of two university central hospitals at the Department of Adolescent Psychiatry in Southern Finland	Registered nurses	Purposive sampling methods
	School, police, rescue service, youth service, social and health care and church in one municipality in Southern Finland	Professionals working with adolescents	
IV	Out-patient clinics of two university central hospitals at the Department of Adolescent Psychiatry in Southern Finland	Registered nurses	Purposive sampling methods

4.5 Instruments

In Phases I and II an interview protocol with six open-ended questions was formed for two focus group interviews with the nurses (Table 2). Focus group interview is an effective data collection method to elicit the views and experiences of a homogenous group (Curtis & Redmond 2007). To ensure a dependable interview process, a plan was made and the interview protocol was pilot tested with three nurses working with adolescents in outpatient clinics not participating in the study (Krueger & Casey 2000). No changes were made to the interview protocol after pilot testing. (Paper I, II.)

Table 2. Topic guide of the focus group interviews in Phases I and II

Phase I: Topic guide of the focus group interview
1. What kind of benefits do you find if an Internet-based support is offered in adolescent psychiatric out-patient care? 2. What kind of disadvantages do you find if an Internet-based support is offered in adolescent psychiatric out-patient care? 3. What kind of facilitators do you identify regarding the utilization of an Internet-based support in the care of adolescents with depression? 4. What kind of barriers do you identify regarding the utilization of an Internet-based support in the care of adolescents with depression?
Phase II: Topic guide of the focus group interview
1. What kind of experiences do you have related to computer and Internet use in daily nursing practice at the adolescent out-patient clinic? 2. What kind of problems have you faced in daily computer and Internet use in nursing practice?

In addition, in Phase II a structured questionnaire was used for data collection. Nurses' attitudes and motivation to use the computer at work were elicited by Burkes' (1991) Nurses' Computer-Use Attitude Questionnaire (Burkes 1991). The questionnaire uses a five-point Likert scale containing 56 propositions and three sections: computer beliefs (18 items), satisfaction with using the computer (21 items), and motivation to use computers (17 items). In addition, nurses' background data were collected using a structured questionnaire to elicit participants' age, gender, working experience in nursing, and experience in current work (Koivunen et al. 2008b). (Paper II.)

In Phase III first, a self-reported computer skills instrument with one Likert-type item was used (1 = very good; 2 = fairly good; 3 = neither good nor poor; 4 = fairly poor; 5 = very poor) (Koivunen et al. 2008b). Second, the Finnish version of the European Computer Driving Licence (ECDL) test was used (The ECDL Finland Oy 2008). This includes six modules but for the purposes of this study three were used: 1) using the computer and managing files (23 items), 2) word processing (22 items), and 3) information and communication (21 items). Scores for each module can vary from 0 (no skills) to 5 (expert). It includes two-point response rates (yes / no). (Paper II). Second, the semi-structured interviews for professionals in basic public services conducted to achieve a better understanding of adolescents' need. The questions were 1) What are the main problems that adolescents aged 15 to 17-years-old encounter? 2) What support do these adolescents need from a professional standpoint? An implementation plan was made to achieve the anticipated benefits of the Internet-based support system in the adolescent psychiatric outpatient clinic. Finally, researchers and nursing staff collaborated to ensure that the features of the intervention were suitable to be adopted as a part of the out-patient treatment environment and process with depressed adolescents. (Paper III.)

In Phase IV a semi-structured interview with open-ended questions was used arrive at a description of the intention to use and actual use of the Internet-based support system for adolescents with depression from the nurses' point of view. The questions were based on the research questions (Table 3). (Paper IV.)

Table 3. Topic guide of focused individual interviews in Phase IV

The topic guide of focused individual interviews
1. What kind of benefits do you find after using the Internet-based support system in the care of adolescents with depressive disorders?
2. What kind of possible disadvantages do you find after using the Internet-based support system in the care of adolescents with depressive disorders?
3. What kind of facilitators do you find regarding the implementation of the Internet-based support system in adolescent psychiatric out-patient care?
4. What kind of barriers do you find regarding the implementation of the Internet-based support system in adolescent psychiatric out-patient care?

4.6 Data collection

In Phases I, II, III the data were collected in December 2008 and January 2009. The researcher arranged a separate information session in each unit. All together 14 nurses received oral and written information about the study. In the information sessions the questionnaires were given to the participants and they were asked to complete the questionnaire in two weeks and send them back to

the researcher. The questionnaire including computer skills using a self-reported computer skills instrument (Koivunen et al. 2008b) and the Finnish version of the European Computer Driving Licence (ECDL) test (Finnish Information Processing Association 2004), and attitudes toward computer were measured using Burkes' (1991) questionnaire. After two weeks 12 nurses returned the questionnaire by mail. The qualitative data were collected by two focus group interviews, one group in each clinic. (Papers I and II.) In addition, in Phase III, data were collected by both telephone and face-to-face interviews in March 2006, participants (n = 7) were professionals working with adolescents. (Paper III.)

In Phase IV the data were collected in February and March 2012. The researcher contacted the managers of those outpatient clinics in which the Internet-based support system had been used. There were nine nurses who were still working in the clinics and the researcher contacted them by email and invited them to participate in interview. All nurses participated voluntarily in the study and two researchers made an appointment for the interview. The oral and written information was obtained before every interview and permission to record the interviews was requested. Eight interviews were held in the participants' workplaces and one was held at a participant's home because she was on maternity leave. Only the participant and the interviewer were present at the interviews. The interviews lasted from 15 to 44 minutes. (Paper IV.)

In Phases I and II the participants (n = 12) were homogenous in both focus groups regarding their professional background and working experience: all participants were registered nurses and had at least 11 years' working experience in psychiatric nursing. Three of the nurses were male and nine were female. Three of the nurses worked as ward managers, but they also participated in nursing care. (Papers I, II.) In Phase III, the participants were the same as in Phases I and II when dealing with nurses (Paper II). In Phase III the professionals' (n = 7) represented different professions working in basic public services with adolescents (Paper III). In Phase IV the participants (n = 9) were all registered nurses using the Internet-based support system in adolescent outpatient clinics. All the nurses had worked more than 13 years as a nurse in mental health care and in an adolescent psychiatric outpatient clinic at least two years. They were all female and two of them was a nurse manager. (Paper IV.)

4.7 Data analysis

In **Phase I, II**, **IV**, the data were analysed using inductive content analysis, which is a systematic method to elicit meaning from the data and gain a more profound understanding of the phenomena (Cavanagh 1997, Polit & Beck 2010). In the inductive content analysis the categories were derived from the data. Before the data analysis, the researcher chose statements as the unit of meaning. First, the researcher carefully read the interview transcripts several times to form a general picture of the data as a whole. The researcher found that saturation occurred in the data analysis, and there was repetition in the themes. Second, the researcher retrieved statements related to the research questions and coded these according to the content of the statements. Third, the researcher formed subcategories based on coded statements with similar content. Before the categories could be named the researcher had to go back to the original data several times. Finally, the subcategories were named according to their content and the main categories were formed by grouping the subcategories together. The stages of the analysis progressed in parallel and at the various stages the researcher had several discussions with the co-authors. The researcher requested feedback on categories and subcategories from the participants: two participants from the focus group interview (Phases I and II) and two participants from the interview (Phase IV). After receiving feedback the findings were

confirmed. (Cavanagh 1997, Graneheim & Lundman 2004, Boswell & Cannon 2007, Polit & Beck 2010.) (Papers I, II, III and IV.)
In **Phases II and III** statistical analyses were used on the quantitative data. Basic descriptive methods were applied (frequencies, percentages) to describe the background data, nurses' attitudes towards the computer and computer skills. For a continuous analysis of Nurses' Computer Use Attitude Questionnaire (Burkes 1991) the sum scores were formed by summing the values of all items within the scale (beliefs; possible minimum 18, possible maximum 90; satisfaction; possible minimum 21, possible maximum 105, motivation; possible minimum 17, possible maximum 85). (Paper II.)

In **Phase III**, on the basis of the inductive analysis the needs-based themes of the support system were formed. Then the support system was developed (information part, exercises and tutor system) and its implementation plan was described. (Paper III.)

Table 4. Instruments, data collection and analysis in different phases of the study

Phase	Instrument	Data collection	Data analysis
I	Semi-structured interview	Focus group interviews (two groups)	Inductive content analysis
II	Semi-structured interview and structured questionnaires	Focus group interviews (two groups) Questionnaires	Inductive content analysis Descriptive statistics
III	Structured questionnaires Focused interview	Questionnaires Interviews	Descriptive statistics Inductive content analysis
IV	Focused interview	Interviews	Inductive content analysis

4.8 Ethical approach and specific considerations

Ethical considerations were born in mind when choosing the research topic (Sumner 2007). Nurses' acceptance of the Internet-based support system is an important research topic because in the psychiatric outpatient context there is a lack of information on how to support the acceptance of IT-based systems in the care of adolescents with depression. The ethical issues and challenges were identified in the study plan (Polit & Beck 2010). In this study, ethical issues were taken into consideration at every study phase (Academy of Finland 2003, TUKIJA 2013). The ethical principles for medical research and the health care legislation were followed (WMA Declaration of Helsinki 2013).

In **Phases I, II, III and IV,** according to the local ethical guidelines, permission to conduct the study was granted by the two hospital district organizations concerned. Before the focus group interviews the researcher visited both clinics and gave the prospective participants oral and written information on the study, including its purpose, practical information about the interviews, and the researcher's contact details. Participants were told about confidentiality issues related to group conversation, which is important to ensure a confidential atmosphere among participants in a focus group (Happel 2004). Before data collection, participants were informed about the voluntary nature of participation and the option to withdraw at any time. Their written consent was obtained before the interviews. Permission to use a tape recorder was obtained. Anonymity of participants was guaranteed in reporting by the use of specific codes which only researcher could connect to any participants' identity (Polit & Beck 2010). (Papers I, II, III and IV.)

In **Phase III** the development of the Internet-based support system raised a number of ethical issues. Adolescents with mental disorders are a vulnerable group and therefore the ethical challenges had to be taken into account at every stage of the development process (Sumner 2007). First, the support system needed to develop into safety electronic platform. Second, the moderating system of the support system needed to be arranged. Third, the moderators of the system needed to be aware of the risks of depressed adolescents' disorders and how to support them. Criteria for warning signs were therefore developed by the administrator and the moderators were trained in it. Fourth, the responsibility for the treatment rested with the adolescent outpatient clinic. Finally, the parents and adolescents needed information on the safety issues of the support system and the directors of the outpatient clinics and the research project leader designed the information sheet for parents and adolescents. Interviews with professionals were conducted with each participant's voluntary participation and oral information was given before every interview. Participants represented their own profession not their organization and therefore no permission was needed from the organization. (Paper III.)

5. RESULTS

5.1 Characteristics of the participants

In Phases I, II, III and IV the study participants were nurses working in adolescent psychiatric outpatient clinics. The characteristics of nurse participants are described in Table 5. In Phase III no background information was collected on the professionals working with the adolescents. The sample size in the study was small but it was considered adequate to answer to the research questions and representative of the phenomenon of interest i.e. the issue of the IT use in adolescent psychiatric out-patient care. The results of this study are reported in four parts with TAM as the theoretical framework. First, nurses' perceptions of the usefulness of the upcoming Internet-based support system are described (Paper I). Second, nurses' perceptions of the ease of computer and Internet use and attitudes toward it in adolescent psychiatric out-patient nursing practice are described (Paper II). Third, the external variables are described from three perspectives: nurses' characteristics (computer skills), features of the Internet-based support system and its implementation (Papers II, III). The fourth part describes the nurses' behavioural intention and actual use of the Internet-based support system (IV).

Table. 5. Characteristics of nurse participants (Papers I, II, III, IV)

	Phase I-III	**Phase IV**
	N=12	N=9
Gender		
Male	3	
Female	9	9
Age	34 – 49 (Mean 42)	37 – 52 (Mean 43)
Work position		
Nurse	9	7
Ward manager	3	2
Work experience	11 – 25 years (Mean 17)	13 – 26 years (Mean 18)

5.2 Perceived usefulness of the Internet-based support system

In accordance with TAM perceived usefulness is reported here as expected benefits and facilitators of the imaginary Internet-based support system (Table 6). The nurses described the benefits of using the imaginary support system in the care of depressed adolescents in three ways**.** First, the nurses proposed that it could influence the care process by improving nurse-adolescent interaction, supporting adolescents' self-management and offering confidential information (care process of adolescent). Adolescents could express their thoughts and feelings via the Internet, which may be considered a mean of self-reflection and of obtaining relief from difficult emotions, such as shame and guilt. Second, the nurses thought that the support system should be developed departing from adolescents' needs, paying attention to clear language and the concreteness of the exercises (factors related to the Internet-based support system). It might support adolescents' involvement in their social lives. Third, the support system could enhance equal nurse-adolescent relationship in care as the nurse's position changed and the adolescent had an expert role with computer skills superior to those of the nurse (changes in nursing tasks). This was seen as a natural phenomenon as adolescents

represent a different technology generation. In addition, a new tool such as the Internet-based support system could offer more choices in nursing practice. (Paper I.)

The nurses described expected facilitators influencing their perceived usefulness of the Internet-based support system. The facilitators cover different factors that affect later use and successful implementation of the system from the nurses' perspectives. Before the implementation of the support system, extensive information and training should be provided to the nurses paying attention to the nurses' positive attitude toward Internet (nurse-related factors). The system should have good Internet access and it should be suitable for compatible with other programmes (functionality of technology). The nurses thought that having one's own room and a laptop computer could increase the use of the Internet-based support system (adequate resources). The nurses pointed out different security-related instructions when implementing the technology-based application in the hospital context (security-related factors). (Paper I.)

Table 6. Benefits and facilitators influencing nurses' perceived usefulness of the Internet-based support system (modified from Paper I, Tables 1 and 2)

Benefits categories and subcategories	Facilitators categories and subcategories
Care process of adolescent • Supporting nurse-adolescent interaction • Supporting adolescent's self-management • Offering confidential information • Relief from guilty conscience and shame **Factors related to the Internet-based support system** • Content from adolescents' needs • Operating environment of adolescents • Encouraging involvement **Changes in nursing tasks** • Changes in nurse's position • New tool	**Nurse-related factors** • Information, experience and training in the use of the Internet-based support system • Positive attitude to the Internet **Functionality of technology** • Functionality of the Internet • Compatibility to other computer program **Adequate resources** • Own room • Laptop computer **Security-related factors** • Controlling misconducts • Solving security challenges

Nurses' perceived non-usefulness of the imaginary Internet-based support system is described in terms of the disadvantages and barriers (Table 7). The nurses described potential negative impact in nurse-adolescent interaction if the support system was not integrated into the care process and interaction between adolescent and nurse (changes in nurse–adolescent interaction). The nurses thought that the Internet-based support system was appropriate for the care of adolescents with mild or moderate depression but using it for care or therapy in major depression might be detrimental to the adolescent (changes in the intervention). The nurses pointed out that in some cases Internet use might have negative effects on a depressed adolescent (negative effects of Internet). The barriers to successful implementation were the opposite to the facilitators: lack of training and negative attitudes (nurse-related factors), different kinds of technical problems (factors related to the Internet-based support system) and lack of instructions or time (organizational factors). In addition, the nurses were worried about possible suicide risk among adolescents with depression which they deemed a barrier to using the support system for those adolescents (ethical issues). (Paper I.)

Table 7. Disadvantages and barriers influencing nurses' perceived non-usefulness of the Internet-based support system (modified from Paper I, Tables1 and 2)

Disadvantages, categories and subcategories	Barriers, categories and subcategories
Changes in nurse-adolescent interaction • Non-integration of nurse-adolescent relationship • Internet as third party in interrelation • Prevent important issues from emerging in interaction **Changes in intervention** • Inappropriate to therapy • Inappropriate to care of major depression **Negative effects of Internet** • Increasing problems of social contacts • Increasing dependency on computer • Confirming trustworthiness of the Internet	**Nurse-related factors** • Lack of training • Negative attitude to using the Internet **Internet-based support system related factors** • Technical problems • Slow Internet connection • Lack of needs of adolescent • Uncertainty of nurses' protection under the law **Organizational factors** • Lack of instructions • Lack of time **Ethical issues** • Suicide risk of adolescents with depression

5.3 Perceived ease of computer and Internet use

The nurses' perceived ease of use was described in terms of their daily computer and Internet use in nursing practice and the problems they encountered (Table 8). The nurses used electronic patient records daily, exchanged information with various other professionals, such as networking by email and they searched for information in the Internet (information transfer related use). With the adolescents the nurses used the Internet to seek information related to activities and hobbies and sometimes the adolescents asked the nurses to read their websites. The nurses also discussed safe Internet use with the adolescents, teaching basic rules (nurse-adolescent interaction related use). The problems nurses face in computer and Internet use on a daily basis was related to the functionality of the technology and use of time (technology-based problems). The technology-based development was not well received when nurses' clerical tasks increased and they need to scan through a great deal of electronic information (role-changing problems). In this context, too, the nurses pointed out the lack of technology and security-based instructions (organizational problems). (Paper II.)

Table 8. Nurses' (n = 12) daily computer and Internet use in nursing practice, and problems therein (modified from Paper II, Tables 2 and 3)

Nurses' computer and Internet use	Problems in computer and Internet use
Information transferring related use • Electronic patient record system use • Intranet use • Information exchange between network **Nurse-adolescent interaction related use** • Using the Internet for information seeking • Teach adolescents how to operate in the Internet • Using Internet to introduce him/herself to a nurse	**Technology-based problems** • Problems in using and working with the Internet • Time-consuming **Role-changing problems** • Increasing clerical tasks • Scanning electronic information • Replaying face-to-face meetings by email **Organizational problems** • Lack of data security instructions • Lack of appropriate training

5.4 Attitudes toward computer and Internet use

Nurses (n = 12) had positive attitudes toward computer and Internet use and they were motivated to use computers on a daily basis in adolescent psychiatric out-patient care. More than half (f = 8) of the nurses believed that computers made their work easier. Most of the nurses felt that the time spent on the computer was worthwhile for their nursing practice (f = 9). Likewise most of the nurses (f = 10) thought that the computer was a better tool for planning patient education and no one disagreed with this. However, half of nurses (f = 6) believed that computer use in nursing practice caused more legal issues. Almost all (f = 10) believed that using the computer in nursing could help keep the costs of health care in check. This finding suggests that positive attitudes promote the nurses' subsequent intentions to use some form of Internet-based support. These results were supported in self-reported attitudes to Internet use: all the nurses (n = 12) reported that their attitudes toward Internet use were very positive or fairly positive. (Paper II.)

5.5 External variables connected with nurses' perceived usefulness and ease of use

In this study applying TAM the external variables were seen as nurses' computer skills, the features of the Internet-based support system and its implementation plan, which influenced the nurses' perceived usefulness and perceived ease of use (Davis et al. 1989, Holden & Karsh 2010). The nurses' computer skills were fairly good and they had enough competence to use the Internet-based support system in nursing practice. According to TAM this result could predict nurses' later behavioural intentions to use the Internet-based support system. The estimations perceptions of the nurses' (n = 12) self-reported computer skills varied from fairly good (n = 4) to rather poor (n = 4), and their Internet skills were reported to be very or fairly good (n = 6), neither good nor poor (n = 5) and rather poor (n = 1). Almost all reported using the computer (n = 11) and Internet (n = 9) daily at home. The results of the ECDL showed that the nurses' computer skills were good and they had enough competence to use the Internet-based support system in the future. (Paper II.)

The Internet-based support system was developed from 2006 to 2008 by Välimäki et al. (Paper III) and pilot tested in November 2008. It consisted of three elements: 1) the Depis.Net programme, where adolescents worked independently, included web-based health information, and self-reflective

written exercises and self-monitoring in an electronic platform; 2) the tutor's regular and needs-based support for the adolescent and 3) the nurse's regular and needs-based support for the adolescent (Figure 3). After the informational themes developed for the adolescents the reflective exercises were developed in collaboration with the nurses. The aim of the exercises was to support adolescents' self-reflection and self-monitoring. The exercises dealt with specific problems the adolescents had defined in the introductory session and the theme of the week. The support system included both tutors' and nurses' regular and needs-based support. The tutor's role was to moderate adolescents' written exercises every weekday and give weekly supportive feedback in the electronic platform. The tutor also sent a weekly text message to move to the next theme. The nurse's role was to discuss with the adolescent the theme she or he was working on and support the adolescent to continue working with the support system. Needs-based support was related to situations where adolescent had written about severe disorders such as suicidal ideation or serious concern about their well-being, or if she or he had not been working in the support system. (Paper III.)

	Adolescent working in the Internet-based support system
Week	**Theme, exercises, self-monitoring and feedback**
Introductory session	Introduction to independent working Describe the focused problem
Week 1	**Well-being** Working with focused problem Working with well-being theme Mood diary Question corner
Week 2	**Home and family** Working with focused problem Working with home and family theme Network map Depression Scale (BDI-21) Mood diary Question corner
Week 3	**Adolescent's rights and responsibilities** Working with focused problem Working with adolescent's rights and responsibilities theme Mood diary Question corner
Week 4	**Adolescent depression** Working with focused problem Working with adolescent depression theme Rating sleeping diary Mood diary Question corner
Week 5	**Treatment of adolescent's depression** Working with focused problem Working with treatment of adolescent's depression theme Assessment of sleeping diary Depression scale (BDI-21) Mood diary Question corner

Tutor's role in the Internet-based support system

Regular support
Introduction session
Every weekday moderation
Weekly text message to move to the next theme
Weekly individual written feedback
Need-based support
Supportive text message in case of an adolescent not doing any weekly exercises
Contact the outpatient clinic if concerned about adolescent's severe symptoms

Nurse's role in the Internet-based support system

Regular support
Weekly discussion to integrate the theme and adolescent's work into the care process
To motivate and support adolescent working regularly in the support system
Need-based support
Discussion in case of tutor's concern about adolescent's severe symptoms

Figure 3. The Internet-based support system

To ensure that the Internet-based support system would be accepted in the outpatient clinic an implementation plan was made to foster the nurses' acceptance (Figure 4). Organizational factors (e.g responsible issues, resources) were included in the implementation plan (Klein & Knight 2005), in the same way as factors associated with successful implementation regarding nursing staff acceptance of a new technology-based system such as attributes of individuals, technology and IT-trainig sessions (Ammenwerth et al. 2006). As a part of the implementation plan a series of educational sessions were arranged to introduce background knowledge about using the Internet-based support system as a part of clinical care. According to TAM, in this phase the intention to use a system serves as a mediator of actual system use (Davis et al. 1989). Before this phase nurses' perceived usefulness of the support system (Paper I) and attitudes toward Internet use in nursing practice (Paper II) were confirmed. This was done because both factors could directly influence behavioural intention to use the Internet-based support system (Davis et al. 1989). The implementation plan was done in collaboration with a steering group to ensure that managers of the hospital were committed to the development work. (Paper III.)

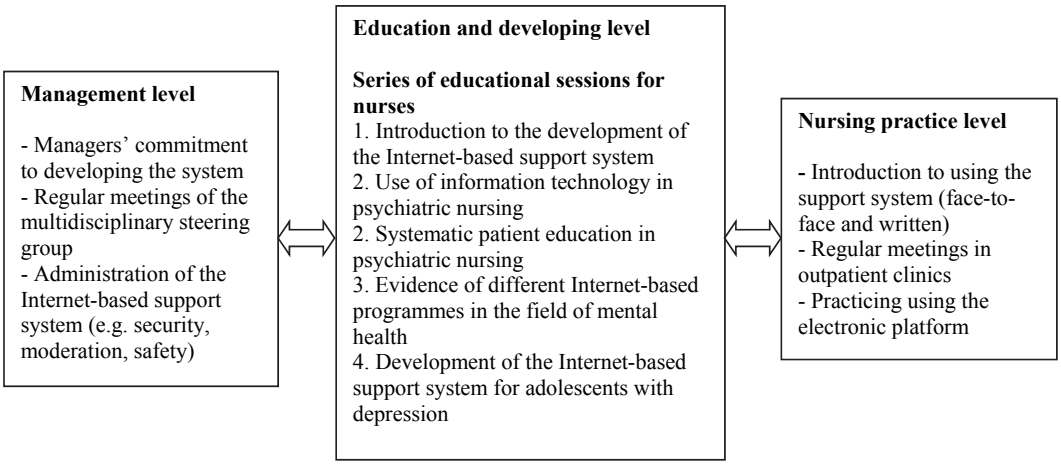

Figure 4. Structure and content of the implementation plan

5.6 Nurses' behavioural intention to use the Internet-based support system

The nurses' behavioural intention to use the Internet-based support system was associated with the opportunity to use the system with adolescent. The nurses thought that the system was a floating part because they could not use it with adolescents. Because of the organizational security regulations this was not possible. However, the nurses had an opportunity to use the support system on their own but they used it seldom or not at all. The nurses' behavioural intention to use the support system would be enhanced if the Internet-based support system was integrated into the care plan of adolescent as an intervention. In addition, the need for the intervention in the adolescent's treatment process should be considered carefully in the multidisciplinary treatment team. The nurses pointed out that the commitment of managers is crucial when implementing a new intervention. This was associated with their later willingness to use the Internet-based system. (Paper IV.)

5.7 Nurses' actual Internet-based support system use

According to TAM nurses' experiences of actual use of the Internet-based support system were explored after one year's use. In general, nurses' perspectives of the Internet-based support system were positive and they mentioned a lot of benefits of using the support system (Table 9). However, they had difficulties integrating the Internet-based support system into the adolescents' treatment. There were various different reasons for this (e.g. hard to remember, unable to see what the adolescent had done in the support system). They reported no disadvantages of using the system with depressed adolescents if it fit into the care plan and if enough support was provided. They thought that the support system could structure and support the care process, and increase adolescents' self-reflection. According to the nurses the support system was suitable for adolescents without severe disorders. (Paper IV.)

Table 9. Benefits and disadvantages of using the Internet-based support system reported by nurses (modified from Paper IV, Table 2)

Nurse-related factors
Benefits:
• improves nursing skills
• enhances understanding of adolescent care process
Disadvantages:
• no option to support adolescent in the support system usage
Adolescent-related factors
Benefits:
• care process: structure, support, self-reflection
• preventive and primary care
• features of the support system (e.g. user friendliness, user-centred design, safety)
Disadvantages:
• not suitable in serious cases (e.g. severe disorders, guilty conscience)
• lack of support from nursing staff

Nurses' experienced facilitators and barriers in successfully implementing the Internet-based support system were divided among factors related to staff, organization, care and technology (Table 10). Nursing staff's positive attitude towards the new intervention could facilitate the implementation. Different kinds of organizational support (e.g. information, training, manager's support) were important in the implementation process. The barriers were related to nursing staff. Different kinds of resistance and attitudes were reportedly barriers, likewise conflicts in different professionals' frameworks. (Paper IV.)

Table 10. Facilitators and barriers related to successful implementation of the Internet-based support system reported by nurses (modified from Paper IV, Table 3)

Nurse-related factors
Facilitators: • positive attitude to the support system • active support for adolescent **Barriers:** • resistance to change • resistance to technology-based intervention • conflicts in professionals' frameworks • increased tasks in nursing practice
Organizational factors
Facilitators: • manager's support • manager's compliance • information dissemination • system deployment training **Barriers:** • difficulties in using IT-based system in direct patient care • lack of IT-support • lack of modern technology
Care of adolescent
Facilitators: • added face-to-face meetings as a support (an additional treatment method) • needs-based assessment in care plan **Barriers:** • IT-based system use without face-to-face contact
Technology-related factors
Facilitators: • security of the support system (e.g. moderation, system protection) • resources (e.g. computers, Internet access, system maintenance) **Barriers:** • complexity of the system

6. DISCUSSION

6.1 Validity and reliability of the study

Generally the validity of a study refers to the degree to which the results are truthful and accurate (Eldridge 2007). Internal validity ensures that the study measures what it is really intended to measure and the credibility of the findings. External validity refers to the transferability and generalizability of the findings and results of the study to other settings. (Shenton 2004.) In this study, the validity and reliability of the qualitative methodology are reflected through the concepts *credibility, dependability, confirmability and transferability*. Credibility is one of the most essential factors in establishing trustworthiness in qualitative research. The credibility of research results confirms the perspectives and experiences of participants' in the study. Dependability refers how the study processes should be reported in detail and the repeatability of data at different times and in different contexts. Confirmability refers to the researcher's concern with objectivity and the extent to which the results can be confirmed by others. Transferability concerns the extent which the findings can be transferred to other contexts or settings. (Shenton 2004, Scott-Tilley 2007, Polit & Beck 2010.)

In Phases I and II credibility was confirmed at all stages of the study process. Nurses' perspectives of the usefulness of the Internet-based support system and their perceived ease of computer and Internet use were explored by focus group interview. Purposive sampling represented the nurses who later used the support system, and thus their experiences were essential from the perspective of the credibility of the results of the study. Careful preparations were made before the focus group interviews (e.g. pre-test of the tape-recorder and topic guide of the interview, written and oral information on the aim of the study) (Polit & Beck 2010). Moreover, before the interview began the researcher stressed that there was no wrong answer and said something about each participant enhancing the open discussion (Krueger & Casey 2000). The interviews were tape-recorded with the nurses' permission. Part of the interview dealt with an imaginary Internet-based support system that did not exist in adolescent psychiatric out-patient care. Thus the participants reflected more expectations than their real experiences, which may have caused difficulties in describing things. Therefore, the researcher described some common examples promoting participants' descriptions which, however, could in some way have influenced their opinions. Three nurse managers also participated in the interviews, which may have influenced the other participants' perspectives. The atmosphere during the interviews was relaxed and open, which increased rich data and credibility (Krueger & Casey 2000). Further, the researcher's professional background as a psychiatric nurse enhanced the credibility of the presentation of the findings because she was familiar with the context. Different study phases overlapped and to increase the credibility of the findings the researcher was reflexivity with data and presentation and she went back to the raw data during the analysis and documentation (Polit & Beck 2010). In phase II, the instrument used was the Nurses' Computer-Use Attitude Questionnaire (Burkes 1991) which measured participants' motivation, satisfaction and beliefs regarding computer use. The internal validity of the instrument was good because it was specifically directed at nurses and the research question related to the nurses' computer attitudes (Polit & Beck 2010).

Dependability was underpinned in this study by describing the study context and the setting and how these affected the way the research findings were approached (Polit & Beck 2010). The dependability was strengthened by using mixed methods. Qualitative and quantitative methods gave a broad picture increasing the understanding of the research phenomena. (Long & Boswell 2007.)

Before the focus group interviews the topic guide and its open-ended questions were pre-tested with three nurses working in out-patient care. Both focus groups were homogenous and the participants knew each other, which facilitated open discussion. The researcher conducted the interviews alone without a facilitator, which may have affected the analysis. Data analysis process together with field notes taken during the interviews was conducted by the researcher alone, which may have impaired the dependability of the study. (Curtis & Redmond 2007, Polit & Beck 2010.) On the other hand, the researcher reflected frequently on the analysis with a researcher colleague and through these discussions the perspective of the researcher was widened, thereby enhancing the dependability of the study (Shelton 2004).

Confirmability validity was supported by different strategies in this study (Shenton 2004). First, the confirmability of the study was strengthened be paying conscious attention to the role of the researcher and her neutrality throughout the study process. This was important because the researcher had worked as a psychiatric nurse in adolescent out-patient care and therefore she reflected carefully her personal views in the study process to avoid bias in the interpretation. (Polit & Beck 2010). However, in the interpretation of the findings of qualitative content analysis it has to be born in mind that a text includes a wide range of meanings. This means that in this study, the researcher's interpretation was influenced by her personal history and experiences. (Graneheim & Lundman 2004.) The participants did not know the researcher before, which enhanced objectivity. Second, consolidated criteria for reporting qualitative research (COREQ), which is a 32-item checklist for focus groups, was used increasing the confirmability of research (Tong et al. 2007). Third, quotations were presented to enhance the understanding of the presentation and verify the accuracy of the data. In Phase II using mixed methods study design may have reduced the effect of investigator bias in qualitative research, which increased the objectivity of the findings (Shenton 2004). In Phases I and II, TAM was used as a theoretical framework to strengthen the understanding of the nurses' perceived usefulness of the support system and their ease of computer and Internet use in adolescent psychiatric out-patient care (Davis et al. 1989).

To facilitate the transferability (or generalizability) of the study a clear and distinct description of the context of adolescent psychiatric out-patient care and the features of the participants, data collection and the process of analysis were presented (Graneheim & Lundman 2004). The number of participants (n = 12) was small, in spite of the absence of dropouts and only two focus groups were conducted in different adolescent psychiatric outpatient clinics. The first interview lasted one hour and included five participants and the second lasted one and half hours with seven participants (Tong et al. 2007). This may have influenced the quality and depth of data. However, data saturation occurred, which enhanced the credibility of the study findings. (Curtis & Redmond 2007, Scott-Tilley 2007.) As a member checking relating to the accuracy of the data researcher requested feedback on the findings from two of the participants; this increased the credibility of the data generation (Shenton 2004). In this study, transferability or generalization of the findings are connected to the technology solutions of two different hospital districts', which may be referred in the different problems nurses faced in daily nursing practice. Moreover, the participants included nurses over 30 years old with several years' working experience in mental health nursing, so there was a lack of younger nurses' experiences, which might have been different.

In Phase II, measuring nurses' attitudes to computers with the Nurses' Computer-Use Attitude Questionnaire (Burkes 1991) the sample size was small (n = 12) thus generalization (external validity) was not attempted in this study. The instrument has been found to be useful tool in many countries worldwide to measure nurses' attitudes to the computer (Burkes 1991, Liu et al. 2000, Koivunen et al. 2010). Internal validity refers to the degree to which an instrument measures and what it is supposed to be measuring. In this study internal validity of the questionnaire was good

because the nurses' attitudes towards computer use were targeted. Reliability describes the internal consistency of an instrument and it was used to refer to the homogeneity of the instrument. (Polit & Beck 2010). In this study Cronbach's alpha values were used to confirm internal consistency and the value was good (satisfaction 0,93; beliefs 0,89; motivation 0,82). In an earlier study the internal consistency of the Finnish version of the questionnaire was found to be satisfactory (Cronbach's alpha varied from 0,83 to 0,96) (Koivunen et al. 2010). The Finnish version of the instrument was translated and backtranslated in a systematic and rigid process which confirms the validity of the instrument (Koivunen et al. 2008c).

In Phase III, the credibility of the Internet-based support system was strengthened in several phases of the developing process. First, the content of the support system was based on the evidence-based theoretical orientation of interventions for adolescents with depression. Second, before the development process the professionals (n = 7) working with adolescents were interviewed. Their experiences were valuable in articulating adolescents' daily needs. The interviewees represented a range of professions, which gave a wider and understanding of adolescents' needs, thereby strengthening the credibility of the development process of the support system. By combining the literature and professionals' views the truth value of the intervention was enhanced (Polit & Beck 2010). Third, adolescents' feedback was also requested on the content and layout of the support system, but this was done as a part of the organizational development work. However, adolescents' opinions were important from the end-user's point of view. Finally, the development process of the support system was described in detail in the article confirming its confirmability. Accurate description of the different phases, setting and decisions refers to the dependability of this study. (Scott-Tilley 2007.) The researcher participated in the developing process after the early stages. This might have influenced to the validity of descriptions due it based on second hand information. The researcher had an active role in development of self-reflective written exercises and self-monitoring in the support system and developing the tutor's and nurse's support for the adolescent.

According to TAM, external variables should be taken into account to support the successful implementation of a new technology-based application (Davis et al. 1989, Holden & Karsh 2010). In this study phase, the nurses' computer skills as external variables were measured by the ECDL test (ECDL Finland Oy 2008). The ECDL test has been used extensively to measure people's computer skills in Finland, also those of nurses. The ECDL test is a valid instrument to obtain a general picture of adults' computer skills, but it is rarely used in scientific studies. In Finland, in an earlier study among psychiatric nurses (N = 76) its internal consistency across different modules has been demonstrated to be high (Koivunen et al. 2007). To confirm the validity of the study the most three appropriate modules from nurses' working role perspective were included in the study.

In **Phase IV**, credibility refers to the confidence and accuracy of the findings as regards the participants. The researcher was involved in every phase of the study and she knew the study context very well because of her professional background and earlier research. Purposive sampling was used and all targeted nurses agreed to participate in the study, which strengthened the trustworthiness of the findings. All participants had experiences of the use of the Internet-based support system in adolescent psychiatric out-patient care. The researcher carefully planned the data gathering and made a topic guide for the interviews. All interviews were tape-recorded with the participants' permission. Two interviewers (the researcher and a master's student trained for the purpose, who had experience of adolescent mental health care) conducted the data gathering. The researcher analysed the data and then discussed several times with trained interviewer about categories and presentation. In content analysis the researcher proceeded slowly and carefully, reverting to the raw data to achieve a more profound understanding of the phenomena and to confirm that the categories were formed from the data. Saturation occurred in the data analysis, and the different themes recurred, which support the

credibility of findings. Member checking was made with one participant. (Graneheim & Lundman 2004, Polit & Beck, 2010.)

Dependability was ensured by a detailed description of the study context and different phases. The other interviewer had been trained in interviewing. Before each interview the investigator explained the aim of study and discussed informally about the topic to encourage an open atmosphere. One of the interviews was conducted at the participant's home because she was on maternity leave, all the other interviews were conducted at the outpatient clinics where the interviewees worked. (Polit & Beck 2010.)

Confirmability was related to the role of the researcher and objectivity in this study phase. As the researcher had become familiar with some of the participants at earlier stages of the research, she could not conduct the all interviews. The trained master's student conducted five interviews and the researcher four of them, ensuring an adequate distance from the participants and so also objectivity. Sufficiently long quotations were presented to enhance the confirmability of the findings (Burnard 2004). During the study process the researcher reflected different phases, data analysis, findings and results with her research group and superior and in the seminars held for doctoral students. In this phase, consolidated criteria for reporting qualitative research (COREQ) was also used establishing accuracy and transparent credibility (Tong et al. 2007). TAM was used as a theoretical framework and provided a reliable structure to contemplate the phenomenon (Davis et al. 1989, Holden & Karsh 2010). However, this qualitative research sought not relationships with the concepts of TAM or causality but a better and more profound understanding of the phenomena, and TAM was suitable for this purpose (Holden & Karsh 2010).

The number of participants recruited through purposive sampling was small (N = 9), but all participants (n = 9) agreed to take part in the study, which confirmed the transferability the trustworthiness of the data and finding. The interviews lasted from 15 to 44 minutes. (Tong et al. 2007.) Some participants had only little experience of using the support system. This may be because the recruitment process for the study was slow and therefore the number of adolescents using the Internet based support tool were low. However, in data collection saturation was reached to a certain degree and in the data analysis process the data were quite rich and comprehensive (Graneheim & Lundman 2004).

6.2 Discussion of the results

6.2.1 Description of perceived usefulness of the Internet-based support system

In the present study, the nurses' perceptions of the usefulness of the Internet-based support system in the out-patient care of depressed adolescents were generally positive. According to TAM, this finding support nurses' later behavioural intention to use the support system (Davis et al. 1989). Our study confirms earlier findings that nursing staff commitment to using IT can be facilitated when they are aware of the benefits related to patient care (Zwaanswijk et al. 2011, Liu et. al. 2013). The findings were also similar to those reported by Holden and Karsh (2010) in a literature review of health care studies using TAM report perceived usefulness is reflected better quality of care or improved patient care. From the nurses' perspective, the support system may have clear potential benefits in the care of adolescents with depression, such as increasing adolescents' self-management, helping them to express themselves and relieving feelings of guilt and shame related to depression disorders. Moreover, the support system may have improved nurses' understanding of adolescents' feelings and daily lives and supported nurse–adolescent interaction, both of which are important

tools in psychiatric care. The nurses' were of the opinion that there is a need for evidence-based, reliable knowledge in the care of adolescents which improves these adolescents' quality of life and equality (Holden & Karsh 2010). This topic is important because, according to the guidelines, psychoeducation is effective in the care of adolescent depression (HMG/DH 2011, Depression Current Care 2013).

The nurses were aware that the Internet is an essential part of adolescents' lives and that they prefer Internet to conventional ways in health information seeking (see Skinner et al. 2003, Horgan & Sweeney 2010, Nelson & Bui 2010). In the field of adolescent psychiatric care this is valuable information because for adolescents who lack the support of adults and who have no one with whom to discuss private health issues the Internet is the primary source of information (Mitchell et al. 2013). However, the greatest variation in the nurses' opinions related to harmfulness of the Internet use. Some of them experienced that Internet use presents a lot of risks in an adolescent's life in general, although others were much more positive about the opportunities Internet provides.

In our study non-usefulness of the Internet-based support system was also identified before the implementation process. Nurses were worried about the integration of a technology-based intervention into the conventional face-to-face interaction. This may imply difficulties in changing traditional working styles in nursing and difficulties in the organization to sustain the new way of working (Klein & Knight 2005). Interestingly, in our study context nurses likewise compared face-to-face interaction to the technology-based intervention even though the Internet-based support system was represented as an adjunct intervention in care. Before implementing the IT-based support system in the care of adolescents it was important to pay attention to legal issues (Li et al. 2013), ethical issues (Maheu et al. 2005), IT-support and training (Koivunen et al. 2008b, Anttila et al. 2011) and adolescents' mental status.

6.2.2 Description of perceived ease of computer and Internet use and attitudes towards it

The nurses in our study used computers and the Internet in their daily practice in psychiatric adolescent out-patient care. This indicated that nurses' perceived ease of computer and Internet use might support their later behavioural intention to use the Internet-based support system (Davis et al. 1989). However, a number of problems related to IT malfunction and the complexity of technology affecting nurses' daily computer and Internet use. Our findings concur with the literature that nurses caring for adolescents' mental health face several challenges in daily IT use (de Veer & Francke 2010, de Veer et al. 2011, Li et al. 2013). This means that technology-related factors could hinder the successful implementation of the Internet-based support system into psychiatric out-patient clinics. Interestingly, nurses already use the Internet with adolescents even though it is not allowed. This may indicate that hospital organizations are lagging behind user-centred services including IT-based applications in mental health services. There is a lack in particular of needs-based training and security instructions. According to the meta-analysis of TAM, when implementing Internet-based applications perceived ease of use has a marked effect on individuals' behavioural intentions to use a new technology-based application (King & He 2006). Therefore it is important in the implementation of the Internet-based support system to take account of the problems related to technology use among nurses.

Nurses' attitudes towards the Internet-based support system were positive, which could facilitate their later behavioural intention to use and their acceptance of a new IT-based intervention. Recently similar results have been reported when nurses' readiness to use IT has improved (Li et al.2013). This may suggest that nurses are no longer lagging behind in technology usage, and they are not so

negatively disposed towards technology as has been reported in earlier studies (Nilson et al. 2008, Wilkinson et al. 2008, de Veer & Francke 2010, Koivunen et al. 2010, Takian et al. 2012). On the other hand, in our study the nurses working with adolescents were aware of how important technology is in adolescent's lives. In this study the nurses also had a long working experience that might give them a deeper insight into a lack of systematic interventions in adolescents' psychiatric care. This is important because among adolescents Internet is one of the major sources of information on mental health (Skinner et al. 2003, Horgan & Sweeney 2010, Nelson & Bui 2010). Moreover, mental health nurses should be aware that Internet is important especially among those adolescents who lack alternatives to ask about privacy-related health issues (Mitchell et al. 2013).

6.2.3 Description of external variables connected with perceived usefulness and ease of use

In the present study, the external variables were significant in the process of developing and implementing the Internet-based support system. First, when developing the IT-based support system for adolescents with depression disorders, safety is a main concern. This concern in particular the ethical issues raised before the development of a new technology-based intervention, and the nurses mentioned as their main concern adolescents' suicide risk. Maheu et al. (2005) also note that ethical challenges, such as technology-related risk assessment, should be identified before implementing an IT-based support system. Second, security issues, such as confidentiality, safeguarding privacy and legal issues were resolved (Maheu et al. 2005). In our study, before the implementation of the Internet-based support system nurses were very concerned about these issues. In addition, there was a lot of confusion among nurses about legal issues related to IT use in nursing. This is a challenge for hospital organizations and calls for organizational support for health care staff (de Veer t al. 2011) when IT-based systems will proliferate in future. Third, it is important to continuously provide the necessary IT support and needs-based tailored training (Anttila et al. 2011, Li et al. 2013) when implementing an IT-based support system in nursing . All nurses were agreed that the IT guidance and training was deficient and in general it was not tailored to the needs of nursing staff. Although the nurses had good IT skills, they still doubted these skills. This may suggest that IT-based solutions in direct patient care are quite rare in psychiatric nursing. Moreover, it is noteworthy to mention how fast IT and Internet have spread in recent years. Five years ago there was a variation between those who used Internet daily and those who did not use at all. Among mental health nurses, especially, many were lagging behind in IT-based working tools and preferred conventional ways of working, such as face-to-face interaction. Nowadays the global spread of the Internet has reached millions of people everywhere, and almost everybody works online at least part of the time, and many use different kinds of IT-solutions. In this study the sample did not include younger nurses from the IT-generation, which would perhaps have offered a wider perspective to IT use in psychiatric nursing practice.

6.2.4 Description of behavioural intention and actual use of the Internet-based support system

This study showed that the Internet-based support system could offer many benefits in the psychiatric out-patient care of adolescents with depression. Nurses' commitment to use IT can be facilitated when they perceive that it promotes the care process of adolescents (Zwaanswijk et al. 2011). From the nurses' point of view they understood how important part IT plays in adolescents' daily lives and it would be natural to utilize its possibilities in the care of adolescents. The study by Li et al. (2013) noted that nurses working in adolescent psychiatric out-patient care were optimistic about technology use. Similar results were found in an adult psychiatric nursing, where nurses identified the benefits of using a technology-based application in the care of patients with mental

health disorders (Anttila et al. 2008, de Veer & Francke 2010). Contrary to some earlier studies, the technology-based application was not seen as a risk in the care of mental health problems (Schwartzman et al. 2012).

The main challenge in our study was to establish how nurses could integrate the Internet-based support system into their conventional way of working. Although the Internet-based support system had potential to support adolescents, it was only partly integrated into daily nursing practice. The nurses had difficulties in encouraging the adolescents to use the Internet-based support system and in discussing the themes of the support system. This finding indicates that the nurses were reluctant to change their traditional working models. The same kind of results have been found earlier in psychiatric acute care in Finland, when nurses' provided support to patients in IT-based patient education sessions (Anttila et al. 2012). Our study confirms the study by Brooks et al. (2011) that behavioural intention and actual use of the technology-based application are connected to resistance from health care personnel, the newness of an idea, tensions between rhetoric on the development level and the action level.

The barriers to the successful implementation of a new technology-based intervention could be related to organizational factors. In our study, the organizational regulations forbidding health care staff to use their computers together with the patient. Due to the regulations the nurses could not even visit the Internet-based support system with the adolescents. All of them mentioned this specific fact as a problem hindering them from getting familiar with the support system. Therefore technology related and organizational factors require attention before the implementation process (Koivunen et al. 2008, de Veer et al. 2011). In Finland this issue is also more significant in hospital organizations because IT-based support systems have rarely been used in clinical practice in direct patient care (Winblad et al. 2012, Himanen 2013). However, in the future, patients expect to receive various IT-based services and there is already evidence that they are satisfied with the use of IT-based communication in health care services (Walwiener et al. 2009) and also in mental health care (Lovell et al. 2006).

The nurses used the Internet-based support system only partially, although according to TAM perceived usefulness, ease of use and external variables were taken into consideration and supported in the implementation process (Davies et al. 1989, Holden & Karsh 2010). The implementation plan included the factors the nurses identified in the earlier stage as facilitating successful implementation of the Internet-based support system into adolescent psychiatric out-patient care (Klein & Knight, 2005). On the other hand, the nurses thought that they were not familiar with the support system and could not use it with adolescents because adolescents work with it independently at home. In some way, the nurses felt they were outside the support system and this could be a reason why they forgot to ask how the adolescent worked with the system. However, the nurses could still use the support system on their own but they rarely did so.

6.2.5 Evaluation of the nurses' acceptance of the Internet-based support system

Our study indicated that there is an obvious need to integrate Internet access into adolescent psychiatric out-patient care. The nurses already used the Internet with adolescents unofficially in the face-to-face meetings. In general, their attitudes towards Internet use in nursing practice were positive. They were familiar with the benefits of Internet-based applications in the care process of adolescents with depression. Moreover, the nurses were aware that the Internet is an essential part of adolescents' everyday lives. This knowledge provides a good basis for the further development and use of the Internet-based support system in direct psychiatric out-patient care.

After one year's use of the Internet-based support system the nurses felt that their professional skills as nurses had improved. In our study the nurses participated in the development process of a new IT-based support system, which may have served to promote their acceptance of the new IT-based support system as a part of the care of adolescents. Moreover, in the planning of the implementation the nurses understood that their experiences, for example, of ethical issues related to the adolescents' care were valuable. It is possible that such experiences depended on the nurses' participation in the development process and they were motivated in general to use the IT-based support system. In other words, according to TAM this may indicate their behavioural intention to use the Internet-based support system but their actual system use was difficult when they should be change working styles.

In the present study an acceptance of the Internet-based support system was described from nurses' perspective. Before the developing the support system it would have been interesting to ask adolescents' perceptions of the perceived usefulness of the support systems in general. In this study adolescents' perceptions would have been valuable to support nurses' acceptance at least in an indirect way. Nurses might have integrated the support system better in their daily nursing practice if they had known that adolescents perceived this kind of support system as beneficial in their care. Adolescents' perceptions would have been important to deepen nurses' understanding of how they could support the adolescent to work in the support system. This knowledge might have positive influence in encouraging nurses to discuss with adolescents the ways in which they have worked independently in the support system. Moreover, adolescents' perceptions regarding to the use of the support system would have highlighted the fact that outside the weekly outpatient meeting they are willing to process important life issues. In the next stage it is important to investigate adolescents' perceptions as the end-user of the support system.

The theoretical approach TAM has influenced the structure of the study and reporting. It gave a deeper understanding to individual factors regarding behavioral intention and actual support system use. It was important to find out these factors were in order to facilitate that the nurses accept a new IT-based intervention in daily practice and do not reject it. However, the TAM was a rather general model from the point of view of increasing understanding of the nature of interaction between nurse and adolescent. As the results indicated, the nurses had difficulties to integrate a new IT-based support system to the interaction with adolescent. Perhaps this perspective would need more understanding, the TAM, however, did not focus on this point of view. To discuss further the nurse-adolescent interaction as a part of technology use and its acceptance will need a theory, which considers this aspect more thoroughly.

The study showed that nurses working in adolescent psychiatric nursing care have a positive stance toward IT-based support system use as a part of care, which provides a good basis for future development. IT-based support systems could increase adolescents' options and build up service user involvement in their care. However, nurses have difficulties in giving up their traditional working styles. Therefore, it is important to pay attention to kind of support provided, to the implementation plans and commitment and support from the part of the organization and its managers. Mental health care organizations should keep up with the development of a new technology and to provide more flexible opportunities to utilize IT-based systems in direct patient care in the future. Following this the possibility of the nursing staff's acceptance of IT use as an inherent part of nursing practices would be improved.

6.3 Implications of the study

This study investigated nurses' acceptance of an Internet-based support system in the psychiatric outpatient care of adolescents with depression. When developing an IT-based support system for adolescents with depression it is important to take account of safety and ethical issues. In this study, the nurses and other professionals participated in the development process of the Internet-based system which offered valuable perspectives on the features of the support system. Before the implementation of a new IT-based system in clinical practice it is important to explore nurses' perceptions related to IT and its use in the care of adolescents and how wiling they are to use it. This knowledge is needed for the implementation plan. The perceived benefits related to the IT-based support system may affect nurses' later acceptance and use. Nurses' acceptance could be facilitated by offering sufficient technology resources and needs-based technology training and support. This study has implications for different areas including nursing practice, nursing management, nursing education and nursing science.

1. Nursing practice
It is important to integrate IT-based support systems into the care of adolescents with mental health problems because technology is an essential part of adolescents' daily lives and a useful way to reach and support them. IT-based support systems offered to adolescents should be developed together with them to ensure that they are user centered. Moreover, the systems should be flexible and easy to use in adolescents' daily living environments. Nurses should be aware that different kinds of technology-based interventions are effective in the care of depression. Therefore effort must be invested in ensuring nurses' acceptance of the technology. When nurses perceive the benefits of IT in patient care they are more willing to accept it. This could be supported by offering education and involvement in the development process. IT-based support system needs consider ethical issues regarding mental health care and this could also facilitate nurses' acceptance. Nurses need to be supported to integrate an IT-based intervention into their daily nursing practice and to be trained using it in the implementation process.

2. Management
Hospital organizations need more resources to use IT-based support in direct adolescent mental health care. This means technological solutions which are safe and easy to adopt in the care of adolescents. Moreover, financial input is needed for technology implementation to ensure that nurses have same kinds of technology solutions as adolescents use (e.g. smart phone, table computer, and wireless access). The implementation plan and support from the organization are crucial in the process of implementing an IT-based support system. Nurse managers especially are in a crucial role in the implementation of a new IT-based intervention. Making an implementation plan should be included in nurses' IT training, likewise continued IT support, the necessary resources, education, meetings, management's and nurse manager's support and regular evaluation. Moreover, clear instructions related to IT use in patient care should be offered to nursing staff. It is also important to consider a positive workplace atmosphere among multidisciplinary teams because this can facilitate the implementation process. Impeding factors, such as reluctance to change the way of working or negative attitudes towards IT use should be identified and taken into account in the implementation.

3. Nurse education
Nursing students need to be trained to use IT as a part of their clinical practice. In nursing education it is advisable to stress nursing students' IT skills, positive attitudes, and the benefits of IT. When training mental health nurses this is especially important as the preference has been for conventional face-to-face interaction. Student nurses need to understand that IT-based support systems could be a useful adjuvant treatment for mental health problems and nurses need to be able to use these in their

daily practice. This means that in the future, nurses working in mental health should be able to use a variety of technology-based applications in direct patient care. It is important that nursing students understand that health care service users are used to receiving their services through various technology applications and whenever the timing is appropriate for the users, or the mental state requires their use and there is enough energy to use these applications.

4. Nursing science
This study produced new evidence based knowledge about nurses' acceptance of the Internet-based support system in the care of adolescents with depression. The study findings showed the factors for the successful implementation and utilization process of Internet-based methods and how to encourage nurses to accept IT, especially in outpatient mental health care services for adolescents. The use of different data collection methods gave a larger picture of the factors associated with nurses' acceptance of the Internet-based support system and its implementation. In this study, TAM was valuable as the theoretical framework of the study and because of its extensive use in earlier health care implementation studies to achieve a more profound understanding of nurses' acceptance of the Internet-based support system and the implementation process.

6.4 Suggestions for further research

The following suggestions for further research emerged from this study:

- More information is needed about how nurses integrated the IT-based support system into the interaction and care process of adolescents with depression.
- Organizational and managerial factors need to be studied from the perspective of how to promote the acceptance and implementation of IT-based support systems in psychiatric nursing.
- More information is needed about how the end users, namely adolescents with depression, use the Internet-based support system.
- The Internet-based support system for adolescents could be implemented in the primary health care context, such as school health care. Factors related to the acceptance of the IT-based support system in primary health care need to be studied.
- There is a need for information about the usefulness and effectiveness of different technology-based support systems (e.g. smart phones) in supporting adolescents' daily lives and in the care of mental health problems, and how nurses accept and use these new technology-based tools.
- The Technology Acceptance Model should be tested with larger samples in psychiatric care.

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