Medicines are part of our everyday lives, including schools. The aim of this thesis was to evaluate the implementation of medicine education, i.e., teaching the rational use of medicines, and the existence of medication management guidelines and practices in schools, and to study factors affecting on both aims. Bronfenbrenner’s ecological systems theory was used to describe the environment of teachers in relation to medicines. This study is based on a survey of Finnish primary and lower secondary school teachers in 2010.
Medicines in Schools

An Ecological Approach to Teachers’ Perceptions
PIIA SIITONEN

Medicines in Schools

An Ecological Approach to Teachers’ Perceptions

To be presented by permission of the Faculty of Health Sciences, University of Eastern Finland for public examination in Mediteknia, Kuopio, on Friday, December 2nd 2016, at 12 noon

Publications of the University of Eastern Finland
Dissertations in Health Sciences
Number 390

School of Pharmacy
Faculty of Health Sciences
University of Eastern Finland
Kuopio
2016
Author’s address: School of Pharmacy
University of Eastern Finland
KUOPIO
FINLAND

Supervisors: Docent Katri Hämeen-Anttila, Ph.D.
Finnish Medicines Agency
FIMEA
KUOPIO
FINLAND

Docent Kirsti Vainio, Ph.D.
School of Pharmacy
University of Eastern Finland
KUOPIO
FINLAND

Reviewers: Associate Professor Lotte Nørgaard, Ph.D.
Social and Clinical Pharmacy
University of Copenhagen
COPENHAGEN
DENMARK

Docent Nina Katajavuori, Ph.D.
Faculty of Pharmacy
University of Helsinki
HELSINKI
FINLAND

Opponent: Professor Lasse Kannas, Ph.D.
Department of Health Sciences
University of Jyväskylä
JYVÄSKYLÄ
FINLAND
Siitonen, Piia
Medicines in Schools: An Ecological Approach to Teachers’ Perceptions
University of Eastern Finland, Faculty of Health Sciences

ISSN (print): 1798-5706
ISSN (pdf): 1798-5714
ISSN-L: 1798-5706

ABSTRACT

Medicines are part of our everyday lives, including schools. Teachers have to deal with teaching the rational use of medicines and pupils’ medication management. The aim of this thesis is to evaluate the implementation of medicine education, i.e. teaching the rational use of medicines, and the existence of medication management guidelines and practices in schools. Further objectives are to study factors affecting teaching medicines, and existing medication management practices. Bronfenbrenner’s ecological systems theory is used as a framework for the study to describe the environment of pupils and teachers in relation to medicines.

This study is based on a cross-sectional questionnaire survey of a representative sample (n=1700) of Finnish primary and lower secondary school teachers carried out in spring 2010. A response rate of 56% (n=928) was achieved. The final study population comprised 667 teachers who had taught health-related topics.

The majority of both primary and lower secondary school teachers had taught or were willing to teach the rational use of medicines in general (76% and 89%, respectively). However, teaching the basic knowledge of medicines was reported only by 21% of primary and 48% of lower secondary school teachers. Corresponding frequencies for teaching prerequisites for the proper use of medicines were 11% and 35%, respectively.

At primary schools, the teachers who provided basic knowledge of medicines were most likely to be those who considered medicines as something harmful, who had experience of medicating their own child’s long-term illness, and had high perceived teaching skills. Correspondingly, lower secondary school teachers who had long teaching experience, a qualification in health education and high perceived teaching skills were most likely to teach medicines-related topics. Approximately half of primary school teachers considered that over-the-counter medicines (OTC) or prescription medicines (Rx) was an appropriate topic to be taught in school (51% and 46%, respectively). Corresponding frequencies for lower secondary school teachers were considerably higher (77% and 71%, respectively).

Most of the teachers surveyed reported that their school had medication management guidelines (primary 73%, lower secondary 76%). However, in answers to open questions, a majority reported medication administration to be the responsibility of a school nurse, and that guidelines instruct them not to administer medicines to pupils. Teachers in the smallest schools, especially primary schools, were more likely to encounter medication administration during the school day than teachers in the biggest schools.

No consistent guidelines dealing with medicines exist in Finnish schools, and teachers encounter challenges with medicines at all levels of ecological systems theory. It seems, that teachers have to rely on their personal experience of medication in order to manage with medicines at school. These results highlight the need for clear and consistent guidance, training and multiprofessional cooperation.

National Library of Medicine Classification: QV 55, WA 18, WA 590, WB 330
Medical Subject Headings: Pharmaceutical Preparations; Schools; Teaching; Health Education; Students; School Health Services; Drug Therapy; Systems Theory; Cross-Sectional Studies; Surveys and Questionnaires; Finland


Suurin osa opettajista (76 % ala- ja 89 % yläkoulun opettajista) oli opettanut tai oli halukas opettamaan lääkkeiden oikeaa käyttöä. Kuitenkin vain 21 % ala- ja 48 % yläkoulun opettajista ilmoitti käsitelleensä perustietoa lääkkeistä. Vastaavasti lääkkeiden oikean käytön perusteita oli opettanut 11 % ala- ja 35 % yläkoulun opettajista. Alakoulun opettajista lisäksi aiheita olivat opettaneet yleisimmin ne opettajat, joiden mielestä lääkkeet ovat haitallisia, joilla oli kokemusta oman lapsen pitkääikaissairauden lääkinnästä tai jotka kokivat kyseisten aiheiden opetustaitonsa hyviksi. Vastaavasti yläkoulun opettajista näitä aiheita olivat opettaneet yleisimmin opettajat, joilla oli pitkä opetuskokemus, terveystedon opettajan pätevyyssä tai jotka kokivat kyseisten aiheiden opetustaitonsa hyviksi. Noin puolet alakoulun ja yläkoulun opettajista oli sitä mieltä, että kouluissa tulisi opettaa oireiden tai sairauksien hoitoa itsehoito- tai reseptilääkkeellä (51 % ja 46 %). Yläkoulun opettajista vastaavat osuudet olivat 77 % ja 71 %.

Alakoulun opettajista 73 % ja yläkoulun opettajista 76 % ilmoitti, että heidän kouluissaan on ohjeet lääkkeiden antamisesta oppilaille. Kuitenkin suurimmassa osassa ohjeita kuvataan vain, että lääkehoidon toteuttaminen on kouluterveydenhoitajan vastuulla ja opettajalta kielletty. Pienten alakoulujen opettajat vastasivat muita yleisemmin, että kouluterveydenhoitajia ei ole aina paikalla vastaamassa oppilaiden lääkitsemisestä.

Kouluilla ei ole yhtenäisiä ohjeistuksia eikä toimintatapoja, joiden mukaan lääkekasvatus toteutuu ja oppilaiden koulupäivän aikainen lääkehoito järjestetään. Opettajat joutuvat luottamaan omiin henkilökohtaisiin kokemuksiinsa ja näkemyksiinsä lääkkeistä, ja opettajat kokevat haasteita ekologisen systeemiteorian jokaisella tasolla. Tulokset korostavat selkeiden ja yhtenäisten toimintaohjeiden, koulutuksen ja moniammatillisen yhteistyön tarpeellisuutta.
Acknowledgements

This research was carried out in the School of Pharmacy (Social Pharmacy), University of Eastern Finland during the years 2010-2016. I want to express my humblest thanks to the School of Pharmacy for the full-time four year position during the years 2013-2016 which enabled this thesis. I also want to acknowledge the fruitful collaboration with the School of Applied Educational Science and Teacher Education, University of Eastern Finland.

I express my deepest gratitude to my supervisors, Docent Katri Häämeen-Anttila, and Docent Kirsti Vainio, for their invaluable, experienced and encouraging advice, guidance and support throughout my research. I really feel fortunate to have had their enthusiastic guidance during my journey in the world of science. You have always been there for me whenever I needed inspiration. It was a great pleasure to work with you.

The official reviewers of this thesis, Associate Professor Lotte Stig Nørgaard and Docent Nina Katjavuori are acknowledged for their expert comments and constructive criticisms. I appreciate their effort to help in improving my thesis. I warmly thank Professor Lasse Kannas for agreeing to be my opponent in the public examination. I feel very privileged to have you as my opponent.

I am grateful to my co-authors Professor Tuula Keinonen, Sirpa Kärkkäinen, PhD, and Vesa Kiviniemi, Lic.Phil., for their valuable advice and contribution to this work. Vesa Kiviniemi gave me valuable statistical support, which I want to acknowledge. I want to thank Tuula Keinonen and Sirpa Kärkkäinen for their warm and gentle guidance to the field of teacher education, and for helping and encouraging me to play more with words. For a person like me with a background in the pharmaceutical chemistry, this has been challenging, but also very rewarding. In addition, I want to thank the whole multidisciplinary research group for giving and sharing ideas. I offer my heartfelt thanks to Research secretary Paula Räsänen for her assistance in practical questions and issues in relating to research.

I wish to thank all my colleagues and friends in the university during these years. Especially, I want to express my sincere thanks to my nearest workmates. I decided not to mention any person by name, but I am sure that if you are having a warm feeling right now, you know it is you I am referring to. We have had many cheerful and hilarious moments at work and also during our free-time. We have had hundreds of coffee breaks, and thousands of sparkling bubbles. Thank you for all the great time I have spent with you.

I owe my warmest thanks to my whole family and relatives. I dedicate this thesis to my parents, who have always encouraged me to study and reach this goal. I know that they would have wanted to see my dissertation - unfortunately this is not possible. But I know that they will be with me on the day. I am grateful to my parents-in-law, Pirkko and Pekka, who have helped greatly with everyday matters. My dear sister Pirjo, thank you for being with me sharing the ups and downs of life. I do not have enough words to express my gratitude.

Finally, I express my deepest love to my husband Olli, and our boys Aapo, Topias and Onni. You have taught me what is the most important thing in life – to love and to be loved.

Kuopio, Pajulahti, November 2016 – with the first snowflakes

Piia Siitonen
List of the original publications

This dissertation is based on the following original publications:


The publications were adapted with the permission of the copyright owners.

In addition, this thesis contains previously unpublished data (presented in chapters 8.1 and 8.3).
Contents

1 INTRODUCTION ......................................................................................................................... 1
2 AN ECOLOGICAL APPROACH ............................................................................................... 3
3 PROMOTING HEALTH AND WELL-BEING ............................................................................. 5
4 MEDICINES AS PART OF WELL-BEING ............................................................................. 7
  4.1 Children's and adolescents' medicine-related behaviour .............................................. 7
  4.2 Medicine education as part of health education ......................................................... 9
  4.3 Medication management during the school day ......................................................... 12
5 TEACHERS AND MEDICINES ............................................................................................. 14
  5.1 Teachers’ perceptions about health and medicines .................................................. 15
  5.2 Teachers’ views about long-term illnesses and medication management ................ 16
6 AIMS OF THE STUDY ......................................................................................................... 17
7 MATERIALS AND METHODS ............................................................................................... 18
  7.1 Study design .................................................................................................................. 19
  7.2 Study population and data collection ......................................................................... 19
  7.3 Content of the questionnaire ..................................................................................... 21
    7.3.1 Outcome measures ................................................................................................. 23
    7.3.2 Independent variables .......................................................................................... 24
  7.4 Data management and analysis ................................................................................. 26
  7.5 Ethical considerations ................................................................................................. 27
8 RESULTS ...................................................................................................................................... 28
  8.1 Teachers’ views about medicine education (unpublished results)............................. 28
  8.2 Implementation of medicine education and topics related to illnesses and medicines  (I, II) ......................................................................................................................... 29
    8.2.1 Associations for primary school teachers ............................................................ 29
    8.2.2 Associations for lower secondary school teachers ............................................. 30
  8.3 Material used in teaching rational use of medicines (unpublished results) ............. 32
  8.4 Guidelines and practices for medicine administration (III) ...................................... 33
  8.5 Summary of the results ............................................................................................... 36
9 DISCUSSION .......................................................................................................................... 38
  9.1 National and organizational factors ........................................................................... 38
  9.2 Interpersonal factors .................................................................................................... 39
  9.3 Intrapersonal factors .................................................................................................... 40
  9.4 Methodological considerations ................................................................................... 42
10 CONCLUSIONS .................................................................................................................... 44
  10.1 Implications for policy and practice .......................................................................... 45
  10.2 Further research ........................................................................................................ 46
11 REFERENCES ....................................................................................................................... 47

APPENDICES
Definitions

Adolescent
According to WHO (World Health Organization 1986) adolescence begins with the onset of physiologically normal puberty, and ends when an adult identity and behaviour are accepted. This period of development corresponds roughly to the period between the ages of 10 and 19 years. According to Nurmi et al. (Nurmi et al. 2014), adolescence can be seen to begin at the age of about 13. In this thesis, the term adolescents refers to individuals aged 13–16 years, i.e. pupils in lower secondary school.

Child, children
In this thesis, the words child and children refer to individuals aged 7–12 years, i.e. pupils in primary school. The term younger child/children refers to children mainly aged 7–9, and older children to those aged 10–12. Where appropriate, the exact ages of children are given.

Disease
“Disease is a medical term, meaning there is a pathological change in the structure or function of the body or mind” (Droege et al. 2016).

Ecological approach
In this thesis, the ecological approach refers to the ecological systems theory of Bronfenbrenner (Bronfenbrenner 1979, Bronfenbrenner and Morris 2006). The approach includes the nested environments of different system levels, the micro-, meso, exo-, macro and chronosystems, which interact with each other to form the overall environment of an individual. The individual’s intrapersonal factors like beliefs, experiences and knowledge also affect the development of an individual in a given context.

Empowerment
A process of building knowledge, skills, and competence leading to enhanced ability of an individual, community or population to influence their health and well-being (Rodwell 1996).

Health
Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO 1948).

Health education
The purpose of health education is “to support the development of the pupils’ versatile health literacy...Phenomena related to health, well-being, and safety are observed in an age-appropriate manner through different areas of health literacy” (Finnish National Board of Education 2014). Education is grounded on a multidisciplinary foundation covering aspects from various disciplines, including health sciences, education, psychology, and sociology.

Health literacy
“Personal, cognitive and social skills which determine the ability of individuals to gain, access to, understand, and use of information, and maintain good health” (Nutbeam 2000). Health literacy can be classified into categories: theoretical knowledge, practical knowledge, critical thinking (Nutbeam 2000), and self-awareness and citizenship (Paakkari and Paakkari 2012).
**Health-promoting school**
“A health-promoting school can be characterized as a school constantly strengthening its capacity as a healthy setting for living, learning and working” (World Health Organization 1998). A health-promoting school engages health and education professionals, teachers, students, parents and community leaders in efforts to promote health.

**Health promotion**
“Health promotion is the process of enabling people to increase control over, and to improve, their health. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Health promotion focuses on achieving equity in health. Health promotion demands coordinated action by all concerned: by governments, by health and other social and economic sectors, by industry and by the media” (World Health Organization 1986).

**Illness**
“Illness is the response of the person to a disease; it is an abnormal process in which the person’s level of functioning is changed” (Droege et al. 2016).

**Long-term illness**
“Diseases which have one or more of the following characteristics: they are permanent, leave residual disability, are caused by nonreversible pathological alteration, require special training of the patient for rehabilitation, or may be expected to require a long period of supervision, observation or care” (World Health Organization 2003). A long-term illness means an illness like asthma, allergy, diabetes or epilepsy. In this thesis, the word illness is preferred instead of disease.

**Lower secondary school**
Compulsory basic education for 13–16-year olds in Finland (Basic Education Act 628/1998, Basic Education Decree 852/1998). Instruction is given by subject teachers. This is referred to as lower secondary school (Grades 7–9), and teachers are referred to as lower secondary school teachers.

**Medication administration**
Medication administration is defined as preparing, giving and evaluating the effectiveness of prescription and non-prescription drugs (Mosby’s Medical, Nursing & Allied Dictionary 2002).

**Medication management**
Medication management in schools consists of the transfer of medication to school, the storage of medication, the administration or dispensing of medication to a pupil, the use of the medications by a pupil, and disposal of the medication. In addition, medication management include documentation of medication storage and administration, the delegation of and liability for medication management duties, the therapeutic appropriateness of a medication, and the availability of drug information (Reutzel and Watkins 2006).

**Medicine**
“A product or a substance intended for internal or external use to cure, alleviate or prevent a disease or its symptoms in humans or animals” (Lääkelaki 395/1987).
**Medicine education**
Medicine education refers to the teaching rational use of medicines, i.e. taking the right medicine for the right symptom/illness, in the proper way, and at the right time. The goal is to educate children to become rational medicine users who are able discuss their own medicine use when visiting a physician and in the pharmacy, to be aware of where to seek reliable information about medicines, and finally to become individuals who can gradually take responsibility for their own medication when they grow up (Hämeen-Anttila 2006c).

**Over-the-counter (OTC) medicine**
A product that can be purchased from pharmacies without a prescription (Sosiaali- ja terveysministeriön asetus lääkkeiden määräämisestä 1088/2010).

**Prescription (Rx) medicine**
A product that can be purchased from pharmacies only with a prescription (Sosiaali- ja terveysministeriön asetus lääkkeiden määräämisestä 1088/2010).

**Primary school**
Compulsory basic education for 7–12-year olds (Basic Education Act 628/1998, Basic Education Decree 852/1998). Instruction is given by class teachers. This is referred to as primary school (Grades 1–6), and teachers are referred to as primary school teachers.

**Pupil**
Children (aged 7–12 years) and adolescents (aged 13–16 years) in compulsory basic education.

**Qualification in health education**
Teaching qualification after gaining 60 ETC credits in health sciences at university level. This has been a requirement for lower secondary school teachers who teach health education since the beginning of August 2012 (Valtioneuvoston asetus 614/2001).

**Short-term illness**
“An acute illness has a rapid onset of symptoms and lasts only a comparatively short time...a cure is possible in most cases” (Droge et al. 2016). In this thesis, a short-term illness is considered to be e.g. a common cold or an infection, or a symptom like headache, which may require the use of a medicine either as needed or as a short regimen.

**Transition phase qualification in health education**
Teachers of biology, home economics, physical education, social studies, and psychology were qualified to teach health education on the basis of their teacher education until 31st July 2012. This was called a transition phase qualification in health education (Valtioneuvoston asetus 614/2001).
1 Introduction

Medicine use is a common activity for children and adolescents (Clavenna and Bonati 2009, Ylinen et al. 2010, Holstein et al. 2015). Relatively high rates for the use of over-the-counter (OTC) medicines have been reported (Ylinen et al. 2010, Holstein et al. 2015). Moreover, about 10% of children and adolescents take medication for some long-term illness (Mäki et al. 2010). However, they have reported barriers related to the proper management of medications in general (Sepponen 2011), and also at school (Newbould and Smith 2007, Smith and Newbould 2008, Särnblad et al. 2014).

Children and adolescents also have considerable autonomy in administering medicines (Stoelben et al. 2000, Bozoni et al. 2006, Holstein et al. 2008). However, their medicine knowledge has been shown to be limited and fragmented (Stoelben et al. 2000, Bozoni et al. 2006, Hämeen-Anttila et al. 2006b, Darmanin Ellul et al. 2008, Kärkkäinen et al. 2014a), and they might have misconceptions, and even fears (Menacker et al. 1999), about medicine use. These facts together with perceived barriers to medication management might lead to the incorrect use of medicines and perhaps failures in treatment outcomes. In fact, as with adults, there is also a poor adherence in adolescents with long-term illnesses (Hanghoj and Boisen 2014, Kyngäs et al. 2000). Non-adherence may lead to poor treatment outcomes, and thus constitute a public health problem (World Health Organization 2003).

Patients’ own responsibility for self-care in both long-term and short-term illnesses is emphasized in national health and medicines policies (Ministry of Social Affairs and Health 2011, Finnish Medicines Agency 2012). In order to achieve this citizens need knowledge, skills and competence, i.e. health literacy, in dealing with issues related to health and medicines (European Commission 2008, Finnish Medicines Agency 2012). These skills can be promoted in schools, which are seen as an ideal setting for promoting and strengthening the health and well-being of children and adolescents (World Health Organization 1996, International Union for Health Promotion and Education 2010, World Health Organization 2013).

The health-promoting school approach is a way to improve the health of students, school personnel, families and other members of the community through a holistic and positive approach (World Health Organization 1996, International Union for Health Promotion and Education 2010, World Health Organization 2013). Health education is a crucial part of its implementation. Medicine education as part of school health education is a way to equip children and adolescents with skills and awareness of issues relating to medicines so that they can make enlightened and responsible decisions in taking care of themselves and managing daily life (Finnish Medicines Agency 2012). The main goal of medicine education is to educate children and adolescents to become rational medicine users who are able to discuss their own medicine use and who have the awareness to seek reliable information about medicines (Hämeen-Anttila 2006c). With this competence children and adolescents can gradually take responsibility for their own medication when they grow up. In the long term, this is a way to reduce misuse of medicines at population level, increase their rational use, and overall get citizens empowered to get play a greater role in self-care (Finnish Medicines Agency 2012).

Medicine education is rather a new initiative in the field of health education, and studies concerning medicine education are scarce (Hämeen-Anttila et al. 2006c). According to previous studies, teachers have shown a positive attitude towards the medicine education (Hämeen-Anttila et al. 2005, 2006a). However, they have found it unfamiliar and thus challenging and problematic to teach (Hämeen-Anttila et al. 2005). Teachers have also considered medicines somewhat a controversial topic, and it has been argued that teachers’ own ideas about medicines might influence the way they react to medicine education
In addition to teaching about medicines, schools and teachers can play a critical role in managing issues relating to children’s and adolescents medications. Although teachers are not obligated to administer medicines to pupils during the school day (National Institute for Health and Welfare 2016), they have a holistic view of children’s and adolescents’ health needs and well-being at school, and they might encounter tasks that are beyond their traditional academic role.

As described above, teachers are the key persons in promoting health and well-being in schools, including proper management of medicines-related issues. In order to educate children and adolescents about medicines and to deal with the issues related to their medications, teachers must acknowledge their important role, and the rationale of medicines-related issues. Studies in the field of health education have shown that teachers’ personal competence, motivation and perceptions about health programmes are the main factors in their commitment to health education in general (Jourdan et al. 2010). In addition, teachers’ professional identity in the context of health education have been shown to be other important factors (Leurs et al. 2007, Jourdan et al. 2016). With regard to medicines, teachers/teacher students have concerns related particularly to inexperience and lack of knowledge about illnesses, particularly about long-term illnesses (Kärkkäinen et al. 2014b), and their proper management (Ercan et al. 2012, Al-Motlaq and Sellick 2013, MacMillan et al. 2015, Dumeier et al. 2015, Siitonen et al. 2016). Teachers are also uncertain about the laws, guidelines, and practices concerning schools’ and teachers’ responsibilities to give medicines to pupils during the school day (Siitonen et al. 2016). It has been shown that there is a lack of uniformity in guidelines and practices (Lancaster 2013, Leyland et al. 2014).

However, apart from teachers’ inexperience with medicines-related issues, little is known about the association between teachers’ medicines-related behaviour and the management of medicines-related issues in the school context. Teachers are lay persons in relation to medicines, and they might hold ambivalent views about medicines like the general population (Britten 1994, Britten et al. 2002). In addition, many teachers are also parents, and parents’ attitudes towards medicines have been found to be associated with their own use of prescription medicines and their own children’s diagnosed illnesses (Hämeen-Anttila et al. 2011). Thus, it can be assumed that teachers’ views about and experiences of medicines, e.g. their own medicine use and experience of medicating children’s long-term illnesses, might influence the way they deal with medicines-related issues in the school context.

Against this background, the aims of the empirical part of this thesis were first to investigate the implementation of medicine education, and second to explore existing guidelines and practices of medication management in comprehensive schools and the factors affecting both aims, particularly at the intrapersonal and organizational levels. For medicine education the objective was to test the hypothesis generated in a previous study that teachers’ beliefs about medicines might influence the content of medicine education (Hämeen-Anttila et al. 2006a), and the aim was to get generalizable results. For medication management on the other hand, this is the first study exploring the issue, and the study design is considered explorative in nature.

The literature review of this thesis provides a conceptual and contextual framework for the study. An ecological approach using Bronfenbrenner’s ecological theory describing the different system levels of the individual’s environment, i.e. micro-, meso-, exo- and macrolevels (Bronfenbrenner 1979, Bronfenbrenner and Morris 2006) was chosen to give a holistic and systematic view of medicines in the school context. The purpose was not to test the theory, but rather first to structure the literature from the viewpoint of both children (Chapter 4) and teachers (Chapter 5), second to structure the summary of the results (Chapter 8.6), and third to interpret the results from the viewpoint of teachers, and discuss their meaning through different ecological levels (Chapter 9).
2 An Ecological Approach

In health promotion research and programmes a variety of theories and models have been applied (McLeroy et al. 1988, Stokols 1996). The behavioural change approach focuses on the individual, while the environmental approach focuses on enhancing people’s physical and social environments. An ecological approach, also referred to as a social ecological approach, integrates both of these strategies describing the interactive characteristics of the individual and the environment.

One of the primary contributors to ecological thinking was Urie Bronfenbrenner (McLeroy et al. 1988). He developed the first version of the ecological theory in the 1970s (Bronfenbrenner 1979), which was revised up until the latest version in 2005 (Bronfenbrenner and Morris 2006). Bronfenbrenner’s ecological theory was originally developed as a theory of human development, but it has been further modified to correspond to the needs of different disciplines and their settings (McLeroy et al. 1988), e.g. home economics (Bubolz and Sontag 1993). In the school context, the social-ecological theory is used to study the factors affecting the teaching sex education (Eisenberg et al. 2012), and the association between the school’s socio-ecological environment and children’s health and well-being outcomes (John-Akinola and Gabhainn 2015). For this thesis, the original version of Bronfenbrenner was chosen due to the lack of a suitable ecological model for the discipline of pharmacy. The theory is used to conceptualize medicines from an individual’s viewpoint describing the whole environment of an individual. Next, the basic elements of theory are described.

The ecological theory describes the nested environments of different system levels, the micro-, meso, exo-, and macrosystems, which interact with each other to form the overall environment of an individual, i.e. the context (Bronfenbrenner 1979) (Figure 1). The microsystem consists of the immediate settings of the individual, and the individual’s personal factors like beliefs, experience and knowledge affecting his/her skills and motivation in the given context i.e. intrapersonal factors (Bronfenbrenner 1979, Bronfenbrenner and Morris 2006).

![Figure 1. The ecological approach to the school context using Bronfenbrenner's ecological systems theory (Bronfenbrenner 1979, Bronfenbrenner and Morris 2006).](image-url)
The mesosystem is a set of interrelations between two or more settings in the microsystem, i.e. interpersonal factors. The exosystem contains settings in which the individual is not actively involved but which nevertheless affect the life of that individual, i.e. organizational factors. The macrosystem is the overall structure containing social, political and economic systems, and culture with values, ethics and beliefs, i.e. the community, and public policy factors. The chronosystem encompasses change or consistency over time in both the characteristics of the person and the context and the environment in which the person lives (Bronfenbrenner and Morris 2006).

The individual at the centre of the theory can be considered to be a child, an adolescent, a parent, a teacher, or any other person of interest. However, according to the theory, it is fundamental, that the focus should be on one individual and his or her environment at a time (Bronfenbrenner 1979). Thus, to indicate the need for both medication education and medication management in schools, children’s and adolescents’ medicine-related behaviour and the foundation for medicine education and medication management are described first. Second, the viewpoint of teachers and their ecological environment and factors related to medicines in the school context are demonstrated. Third, the results are presented particularly from the national, organizational and intrapersonal viewpoint, and finally, the ecological approach is used in summarizing and discussing the results from the viewpoint of teachers.
3 Promoting Health and Well-Being

Health and medicines policies aim to empower citizens to take a greater role in maintaining and strengthening their health and well-being, including the appropriate use of medicines (European Commission 2008, Ministry of Social Affairs and Health 2011, Finnish Medicines Agency 2012). In order to achieve this, citizens need a high level of health literacy (European Commission 2008, Finnish Medicines Agency 2012), which is regarded as an important determinant of an individual’s health-related behaviour (Nutbeam 2000, Manganello 2008, Paakkari and Paakkari 2012). Health literacy is illustrated as a hierarchical structure starting from theoretical knowledge through practical knowledge to the most enhanced levels of critical thinking (Nutbeam 2000) and self-awareness and citizenship (Paakkari and Paakkari 2012) (Figure 2). All these components show the gradual and progressive nature of health literacy for an individual’s greater autonomy and empowerment in health-related behaviour. Hence, health literacy can be seen as a tool for increasing empowerment. Empowerment is defined as an individual’s enhanced ability to actively understand and influence their health status (Rodwell 1996). In the context of this thesis, empowerment means giving children and adolescents sufficient knowledge, skills and competence about medicine use to gradually take more control over own medicine use, and to be able to participate in wider social settings (Hämeen-Anttila 2006).

School is seen as one of the main settings in promoting and strengthening health and well-being among children and adolescents (World Health Organization 1998, World Health Organization 1999, International Union for Health Promotion and Education 2010, World Health Organization 2013). A health-promoting school can be characterized as one that is constantly strengthening its capacity as a healthy setting for living, learning and working (World Health Organization 1998). The health-promoting school concept involves improving the health of students, school personnel, families and other members of the community through a holistic and positive approach (World Health Organization 1998, World Health Organization 1999, International Union for Health Promotion and Education 2010). Although a Health-Promoting School focuses on all aspects of school life, health education is a key part of the approach (World Health Organization 1999, Finnish National Board of Education 2014). Medicine education as part of health education is presented in Chapter 4.2.

Konu and Rimpelä (2002) have discussed the health-promoting school approach, and presented a model of well-being in schools. The Well-Being in Schools model contain four specific indicators: school conditions, social relationships, means for self-fulfilment and health status, each containing several aspects affecting the school day and well-being (Konu and Rimpelä 2002) (Figure 2). The model shows that health status including both long-term and short-term illnesses, and the medications used for them constitute an important part of well-being in schools, and thus the importance of implementing medicines issues in the school context. To construct the overall foundation of this thesis, the Well-Being in Schools model is supplemented by taking into account an ecological approach, the health-promoting school approach, and the concepts of health literacy and empowerment described above. The model can be viewed from pupils’ and teachers’ viewpoints. From the teacher’s viewpoint “teaching and education” could be considered as continuing education, while “learning” could be viewed as achievements or coping with work (Konu and Rimpelä 2002). It is emphasized that in developing the health-promoting school environment and well-being at school, the school staff’s own competencies should also be enhanced (World Health Organization 1999).
Figure 2. A representation combining an ecological model (Bronfenbrenner 1979), a Well-being in Schools model (Konu and Rimpelä 2002), The Health-Promoting School approach (WHO 1998) and concepts of health literacy and empowerment (Nutbeam 2000, Manganello 2008, Paakkari and Paakkari 2012).
4 Medicines as Part of Well-Being

In this thesis medicines are dealt with as part of well-being in schools. Medicines are viewed 1) as part of health education, i.e. medicine education, and 2) as maintaining pupils’ health status during the school day, i.e. medication management. The different system levels of the ecological environment (Bronfenbrenner 1979, Bronfenbrenner and Morris 2006) and factors, i.e. factors of national (macro), organizational (exo), interpersonal (meso) and intrapersonal (micro) levels, associated with medicines in the school context are described. In this chapter, the context of this thesis is justified by demonstrating the importance of integrating medicines into the school curriculum and into everyday practice in schools. First, children’s and adolescents’ medicine use and medicine-related behaviour, i.e. the intrapersonal level of the ecological approach, are described (Figure 3). Second, the national laws and guidelines and organizational factors concerning medicine education and medication management, i.e. the national and organizational levels, governing schools are demonstrated.

In Chapter 5, the focus shifts to the teachers and their ecological environment and to factors related to medicines in the school context. Correspondingly, the focus is on teachers’ views, skills and experience, i.e. intrapersonal factors regarding issues relating to health, medicines and illnesses in the school context (Figure 5).

![Figure 3. The different system levels of the ecological approach and factors associated with the use of medicines among children and adolescents (Hämeen-Anttila 2006, Sepponen 2011, Hämeen-Anttila and Rytkönen 2014, Lindell-Osuagwu 2014, Siponen 2014, Hokkanen 2015).](image)

4.1 CHILDREN’S AND ADOLESCENTS’ MEDICINE-RELATED BEHAVIOUR

This chapter describes the intrapersonal factors, i.e. experiences, knowledge, beliefs, skills and competence, of children’s and adolescents’ ecological environment related to medicines.
Medicine use frequency and autonomy in medicine use

About 20% of Finnish children and adolescents are reported to have an illness or symptom they have suffered from for over 6 months (Tapanainen and Rajantie 2016). Mental health disorders, allergies, asthma, epilepsy and diabetes are the most common long-term illnesses (7–20%, 15–20%, 4–7%, 0.7% and 0.4%, respectively) among children and adolescents. About 10% of children and adolescents (7, 11 and 14-year olds) are on permanent medication for some long-term illness (Mäki et al. 2010).

Approximately 40% of Finnish children (7–12-years old) and adolescents (13–16-years old) receive at least one prescribed and reimbursed medical product during one year (Lindell-Osuagwu 2014). For both children and adolescents the most prescribed and reimbursed medicines are anti-infective agents and respiratory medicines. The international prevalence rate of prescription medicines for children and adolescents is reported to vary from 51% to 70% (Clavenna and Bonati 2009).

According to a Finnish population-based study, the prevalence reported by parents for both prescription and OTC medicines was 17% for children under 12 years (Ylinen et al. 2010). The most commonly used prescription medicines were reported to be those for obstructive airway illnesses, while analgesics and antipyretics were the most common OTC medicines used. The prevalence of self-reported medicine use for headache in adolescents in different countries/regions in Europe, USA and Canada varied from 31% to 58%, being higher for girls than boys in every country/region (Gobina et al. 2011). In addition, the prevalence of self-reported medicine use for headache among adolescents increased from 1986 to 2010 in many of these countries/regions (Holstein et al. 2015). Moreover, among 15-year olds, the self-reported prevalence of medicine use for headache was the highest (70%) among Finnish girls compared to other countries (Gobina et al. 2015).

Self-administration of medicines is quite common among children and adolescents. They have reported rates of accessibility and/or availability of medicines ranging from 37% to 68% (Chambers et al. 1997, Stoelben et al. 2000, Sloand and Vessey 2001, Bozoni et al. 2006, Holstein et al. 2008). For example, 68% of Danish children (11-year olds) and adolescents (13-year olds) have reported having access to medicines for headache at home, and a third of adolescents were allowed to use these independently (Holstein et al. 2008). Most of these children and adolescents have received their medicines for headache from parents, but these medicines were also received from school nurses, teachers and friends, especially among 13-year-old girls. Finnish children (10–11 year-olds) have evaluated that children of about their own age or a few years older could safely take medicines independently (Kärkkäinen et al. 2014a).

Medicine knowledge and beliefs about medicines

Children’s knowledge and understanding of illnesses and medicines has been found to increase with age (Menacker et al. 1999, Bozoni et al. 2006, Hämeen-Anttila et al. 2006b, Whatley et al. 2012), and thus according to their cognitive development (Nurmi et al. 2014). Younger children (under 10 years old) are more likely to refer to medicines by their external appearance, e.g. colour, form or taste, or therapeutic purpose, e.g. headache, cough and fever (Menacker et al. 1999, Hämeen-Anttila et al. 2006b), rather than their generic or brand names like older children (over 10 years old) do (Bozoni et al. 2006, Kärkkäinen et al. 2014a). However, even adolescents (over 13 years old) can have misconceptions about the relationship between the external appearance and action of medicines (Darmanin Ellul et al. 2008). Understanding that the same medicine could have more than one name (Darmanin Ellul et al. 2008) or explaining the ingestion of a medical agent (Stoelben et al. 2000) can also be challenging to them.

In general, children and adolescents know a variety of short-term illnesses treated by medicines in terms of their generic or brand names. In contrast, the preventive use of medicines (Menacker et al. 1999, Hämeen-Anttila et al. 2006b), the role of vaccines and the mechanism of action of antibiotics or their role in curing diseases were not familiar to them.
Menacker et al. 1999, Stoelben et al. 2000, Bozoni et al. 2006, Hämeen-Anttila et al. 2006b, Darmanin Ellul et al. 2008, Kärkkäinen et al. 2014a). Children were aware that medicines can have both helpful and harmful effects (Menacker et al. 1999, Stoelben et al. 2000, Hämeen-Anttila et al. 2006b, Darmanin Ellul et al. 2008, Whatley et al. 2012, Kärkkäinen et al. 2014a). They believed that medicines should be taken only when really needed or they preferred not to take medicines at all (Hämeen-Anttila et al. 2006b), older children being more reluctant than younger children (Bozoni et al. 2006, Whatley et al. 2012). Further, older children considered the possible harmful effects of medicines or the risks related to their use more than younger ones (Menacker et al. 1999, Hämeen-Anttila et al. 2006b). Ideas, and even fear of death (Menacker et al. 1999), about taking the wrong medicine or a medicine belonging to someone else have been reported (Menacker et al. 1999, Hämeen-Anttila et al. 2006b, Kärkkäinen et al. 2014a).

4.2 MEDICINE EDUCATION AS PART OF HEALTH EDUCATION

As shown in the previous chapter, although medicine use is common among children and adolescents, their knowledge and understanding of illnesses and medicines-related topics is limited and fragmented.

The first reports of the importance of teaching children and adolescents about the rational use of medicines were published years ago (Bush 1990, Bush et al. 1999, International Pharmaceutical Federation 2001). The reports emphasize that medicine education should be part of school health education and taught in a manner appropriate to children’s and adolescents’ stage of development. In addition, medicine education should be seen as cooperation between children, parents, teachers, and health care professionals (Figure 3). In school health education, teachers focus on the use of medicines in general, whereas health care professionals focus on the use of medicines by individuals (Hämeen-Anttila 2006), and parents are role models for the use of medicines in everyday life (Hokkanen 2015).

However, despite recognition of the importance of medicine education as part of school health education, education focusing on the rational use of medicines is rarely part of school curricula. Around the world, education about medicines has focused on the abuse and risks of misusing medicines (Department of Education Training and Youth Affairs 1999, Department for Education and Skills 2004, Department of Health and Human Services 2006, Darnell and Emshoff 2008) rather than their rational use. However, it is recommended that awareness about the rational use of medicines should be taught separately from the incorrect use of medicines in order to prevent fears that may complicate medicine use during illnesses (Bush et al. 1999, Hämeen-Anttila 2006).

National level

In Finland, the importance of medicine education is recognized at the national level (Finnish National Board of Education 2004, Finnish Medicines Agency 2012). The national core curriculum contains the framework and guidelines for education and the objectives and key contents of instruction. At the time when this study was conducted, medicine education was described as part of health education in school curricula as follows: “the pupils know how to describe the most common children’ diseases, their symptoms, and self-care; they will know the basic rules of using medicines” (for Grades 1–6, 7–12-year olds) and “the pupils know how to make observations about their emotions and symptoms, and know the basics of the appropriate use of medicines” (for Grades 7–9, 13–16-year olds) (Finnish National Board of Education 2004).

The national core curriculum for basic education was revised in 2014 (Finnish National Board of Education 2014). The general goals of the new curriculum are aiming for transversal competences, which “refers to an entity consisting of knowledge, skills, values, attitudes and will” (Finnish National Board of Education 2014). The transversal competences are divided into seven areas (Figure 4), under which the objectives of the instruction and key content are placed. As a result of this broader approach, detailed descriptions of topics that should be
taught were removed, and the specific references related to medicines and rational use of medicines were not included. For now, the core content of medicine education can be placed under the transversal competence area of taking care of oneself, managing daily life, and under the objectives and key contents of environmental studies (Grades 1–6) and health education (Grades 7–9) presented in Figure 4.

Organizational level
The local school curriculum based on the national core curriculum is prepared by the education provider (Finnish National Board of Education 2014). In the local curriculum, the local special features and pupils’ needs are taken into account. The integrative and multidisciplinary nature of instruction is seen as an important feature for learning. This means content of instruction and working methods in which phenomena from the real world are examined. The content of medicine education arising from everyday life can be easily adapted to these principles of integrative instruction and multidisciplinary learning. To integrate medicines related topics into instruction at the local school level, medicine education websites (www.laakekasvatus.fi) containing ready-to-use material targeted at children and adolescents of different ages can be freely used by teachers interested in medicine education (Hämeen-Anttila 2006, Finnish Medicines Agency).

The content of teacher education as well as continuing education form the basis for teachers’ knowledge and skills to teach different subjects. In primary school (Grades 1–6), instruction is given by class teachers who are qualified to teach all subjects, including health education, on the basis of their teacher education (Finnish National Board of Education 2008). In primary school, health education including medicine education, is taught as part of environmental studies. However, class teachers have rarely received any training to provide medicine education (Kärkkäinen et al. 2014b).

In lower secondary school (Grades 7–9), health education is separate subject, and instruction is given by specialist subject teachers. Health education is mainly taught by teachers of physical education, home economics and biology (78, 56, and 49%, respectively) (Aira et al. 2009). These teachers were qualified to teach health education on the basis of their teacher education until 1st August 2012 (Valtioneuvoston asetus 614/2001). For now, the qualification of health education subject teacher, meaning 60 ETC credits in health sciences at the university level, is a requirement. According to a study conducted among lower secondary school teachers in 2007, only about one fifth (21%) of teachers teaching health education had acquired the qualification and a fifth (19%) were in the process of completing it. In addition, about a third (29%) of teachers had undertaken shorter courses in health sciences (Aira et al. 2009). In 2008–2009, 60% of lower secondary schools reported having at least one teacher who had completed the full qualification (Aira 2010). Schools in Southern Finland and schools with large numbers of pupils (over 300) were most likely to report this situation. In other words, factors at the organizational level were affecting reported practices.
The core contents of medicine education according to the national core curriculum’s transversal competence area of taking care of oneself, managing daily life. The objectives of instruction of environmental studies (Grades 1–6) and health education (Grades 7–9) and content areas related to the objectives are presented (Finnish Medicines Agency, Finnish National Board of Education 2014).
4.3 MEDICATION MANAGEMENT DURING THE SCHOOL DAY

In view of the relatively high rates of long-term illness and medications, it is very likely that every classroom contains at least one child or adolescent with at least one long-term illness for which he/she is taking medication. Medication for a long-term illness might also be required during school time to ensure the well-being of children and adolescents at school. Furthermore, pupils with long-term illnesses might encounter life-threatening emergencies during the school day. Symptoms such as headache are common among children and adolescents (Mäki et al. 2010, Luopa et al. 2014, World Health Organization 2016) and non-prescription medication like pain relievers might also be needed at school.

Medication management at school requires clear and consistent guidelines developed in cooperation between different professions. These guidelines are meant to help schools to develop medicines policies, to draw up individual health care plans, to define roles and responsibilities, and to handle medicines safely (Department for Education 2015, Council on School Health 2009). However, around the world, these guidelines vary considerably (Lange et al. 2009), and medication errors are relatively common in schools (Canham et al. 2007, Clay et al. 2008). In general, the responsibility for administering medication to pupils at schools should rest with health care professionals, in particular school nurses (Department for Education 2015, Council on School Health 2009). However, the presence of a full-time school nurse is limited and medicines often have to be administered by school staff (Kelly et al. 2003, Wong et al. 2004, Ficca and Welk 2006) who are lay persons as far as medicines are concerned.

National level
According to Finnish national legislation pupils should have a safe learning environment, which includes physical, psychological and social safety (Basic Education Act 1267/2013, Primary Health Care Act 66/1972, Health Care Act 1267/2010). Under the Pupil and Student Welfare Act (1287/2013), pupils are entitled to free welfare services necessary for their participation in education. Also, the revised national core curriculum emphasizes the importance of pupil welfare as part of schools’ basic activities (Finnish National Board of Education 2014). The national guidelines instruct schools to have policies for medication management if they have pupils who need medication during the school day (National Institute for Health and Welfare 2016).

Organizational and interpersonal levels
The national core curriculum for basic education describes the goals for pupil welfare, emphasizing the holistic approach and cross-sectoral cooperation (Finnish National Board of Education 2014). These goals are put into practice through the local school welfare plan, which should be prepared jointly by health care providers, school staff, pupils and parents (Pupil and Student Welfare Act 1287/2013, Finnish National Board of Education 2014).

Local health care providers are responsible for organizing health services for pupils during the school day (Primary Health Care Act 66/1972). These services are provided by school nurses in conjunction with school doctors. The duties of school nurses’ focus on preventive work, e.g. physical examinations, screening and providing health education. School nurses also give emergency care when needed, and they can provide pupils with OTC medicines, e.g. for headache.

School nurses are also in a key position to arrange meetings with parents, school staff and health care professionals when there is a need to draw up individual health care plans for pupils with long-term illnesses. These health care plans describe treatment practices, first-aid procedures, and the division of tasks and responsibilities. The organization of medication management in the event of a pupil’s illness is described as one part of individual pupil welfare (Pupil and Student Welfare Act 1287/2013, Ministry of Social Affairs and Health 2004,
This need to organize medication administration has raised discussion about schools’ and teachers’ responsibilities for giving medicines to pupils during the school day (Helsingin Sanomat 3.8.2014b). According to recommendations, the treatment of children with long-term illnesses lies outside the duties of school health care (Ministry of Social Affairs and Health 2004). In addition, according to national estimates, the recommended ratio of school nurse to pupils is not met (Wiss et al. 2012). The school nurse might be present only once or twice a week or even a month, in particular in the smallest schools. This represents a challenge for schools to organize medication administration for both short- and long-term illnesses. School staff are not obliged to administer medicines during the school day but are allowed to do so after undergoing training by a licensed health care professional (National Institute for Health and Welfare 2016). On the other hand, professional unions have stated that medication management lies outside the duties of teachers, who are employed primarily to educate, and recommend they do not participate in medicating pupils (Puustinen 2009). However, they have also underlined that teachers, like all other individuals, are required to take rescue action in the event of a life-threatening situation (Helsingin Sanomat 3.8.2014a, Rescue Act 379/2011).
5 Teachers and Medicines

The ecological approach for teachers and the factors relating to medicines in the school context at different system levels are shown in Figure 5. Chapter 4 described the factors relating to medicine education and medication management at national, organizational and interpersonal levels. In the following, the focus is on teachers’ beliefs, skills and experience, i.e. intrapersonal factors, about health and medicines-related issues.

At the intrapersonal level, teachers can be seen as lay persons in relation to medicines. In general, people’s perceptions and attitudes towards medicines are somewhat ambivalent, and can be expressed in dimensions like beneficial-harmful, good-bad, pleasant-unpleasant (Britten 1994, Britten et al. 2002). Many teachers are also parents, and their relationship to medicines can be seen in the parental and family context. Parental attitudes towards medicines are seen to correlate with parents’ own use of medicines and their child’s illness (Hämeen-Anttila et al. 2011). It has been found that parents who use prescription medicines themselves have a more positive attitude towards using medicines in general than parents who use no prescription medicines. It has also been shown that people using prescription and/or OTC medicines were more likely to report stronger positive beliefs about medicines than non-users (Andersson Sundell and Jönsson, 2016). In other words, teachers’ own medicine use and experience of medicating their own child’s long-term illness might influence the teaching of medicines-related topics and perceptions about medication administration practices at school.

Figure 5. The different system levels of the ecological approach and factors associated with medicines from the teacher’s viewpoint (Valtioneuvoston asetus 614/2001, Puustinen 2009, Pupil and Student Welfare Act 1287/2013, Basic Education Act 628/1998, Basic Education Decree 852/1998, Finnish National Board of Education 2014, Moynihan et al. 2015).
5.1 TEACHERS’ PERCEPTIONS ABOUT HEALTH AND MEDICINES

Health education is grounded on a multidisciplinary foundation covering aspects from health sciences, education, psychology and sociology (Finnish National Board of Education 2014). The competencies required for a health education teacher can be divided into factors of knowledge, skills and attitude (Moynihan et al. 2015). Knowledge includes general content knowledge of health issues, determinants affecting health, and health education curricula in general. Skills encompass communication and ethical thinking skills and skills in planning, implementing and assessing health-promoting initiatives. The attitude-based factor includes the teacher’s willingness to engage in teaching health education and in promoting well-being in general. It has been shown that teachers’ attitudes towards health education influence their motivation to develop health education (Jourdan et al. 2010). In this thesis, the intrapersonal level of a teacher consists of factors of beliefs, experience and knowledge, which affect teachers’ skills and practices in health and medicines-related issues.

Nutrition, taking exercise, physical growth and development, mental health, drug and alcohol abuse prevention, disease prevention, and sexuality are among the most common topics in health education (Aira et al. 2009). In addition, according to a study by Aira et al. (2009), most lower secondary school teachers have taught issues about medicines as part of health education, and most teachers considered the objectives regarding the rational use of medicine to be important. However, it can be argued that most health education topics are not especially controversial, and attitudes towards them are unambiguous. On the other hand, sexuality can be considered to be a more controversial topic, and teachers’ motivation and willingness to teach it may be influenced by attitudes towards, and beliefs about, the subject in general. It has been found that teachers whose attitudes towards sex education are positive and who are more comfortable teaching sex education are more likely to teach it (Cohen et al. 2012). In addition, teachers’ perceptions of their knowledge of sexual health were found to be an important component of their willingness to provide sexual health education. Trained teachers and teachers experienced in teaching sex education show a more positive attitude towards the topic (Ramiro and de Matos 2008). Overall, teachers’ attitudes towards the topic being taught might be considered to directly influence the actual teaching of that topic.

Medicine education can also be seen as a controversial topic. Teachers may have strong views and beliefs about medicines, which may influence their teaching of medicines-related topics. In the first Finnish studies concerning medicine education it was found that although teachers considered medicine education to be an important topic to teach (Hämeen-Anttila et al. 2005), both empowering and paternalistic attitudes were revealed (Hämeen-Anttila et al. 2006a). Empowering teachers wanted to teach children the basic principles of medicine use, to encourage them to use medicines rationally, and to find reliable information about medicines. Paternalistic teachers wanted to restrict the information about medicines to parents. They also attempted to educate children mainly about the dangers related to medicine use. However, no quantitative research has been conducted on teachers’ attitudes towards medicines and their influence on the content of medicines education as part of school health education.

The basis of teachers’ competence to teach issues related to health and medicines is formed in teacher education as well as in continuing education. However, issues related to medicines are rarely included in teacher education curricula, and studies concerning teachers’ knowledge about medicines, and their skills to teach medicine-related issues are scarce. In the study by Kärkkäinen et al. (2014b) teacher students had concerns about their ability to teach medicine-related issues. They reported having poor knowledge for teaching about long-term illnesses and basic knowledge of what medicines are.
5.2 TEACHERS’ VIEWS ABOUT LONG-TERM ILLNESSES AND MEDICATION MANAGEMENT

National guidelines are implemented through local policies and practices, and all schools should have their own policies on administering medicines. However, there is a paucity of research concerning teachers’ views about schools’ guidelines and practices concerning medication management. Moreover, to the author’s knowledge, there are no Finnish studies on this topic.

Studies conducted in other countries show that there is a discrepancy between national level guidelines and existing local level guidelines (Lancaster 2013, Leyland et al. 2014). A lack of uniformity has been found in policies and practices between schools, even those close by (Wong et al. 2004, Chakraborty and Hamer 2005). While schools report they have a policy for medication administration, insufficient training of school staff and documentation of medication administration has been demonstrated (Lancaster 2013, Leyland et al. 2014).

Teachers report experiencing discomfort performing duties that extend the traditional role of the teacher (Leyland et al. 2014) and have concerns related to inexperience and lack of knowledge about long-term illnesses. In particular, teachers’ views and concerns about diabetes (Amillategui et al. 2009, Pinelli et al. 2011, Boden et al. 2012, Marks et al. 2014, MacMillan et al. 2015), asthma (Getch and Neuharth-Pritchett 2007, Bruzzese et al. 2010, Sandsund et al. 2011, Lucas et al. 2012, Al-Motlaq and Sellick 2013), allergies and anaphylaxes (Morris et al. 2011, Ercan et al. 2012, White et al. 2015), and epilepsy (Cross et al. 2013, Toli et al. 2013, Mecarelli et al. 2014, Dumeier et al. 2015), and their management in the school context are well established. In general, teachers consider themselves moderately or very responsible for dealing with children’s long-term illnesses during school time (Clay et al. 2004). However, they have reported not receiving enough academic preparation or information about different long-term illnesses, their impact on the classroom or their emergency procedures, and they have fears of litigation should something untoward occur (Olson et al. 2004, Dumeier et al. 2015). Although teachers are not obliged to administer medicines to pupils on a regular basis, they should all receive general training about emergency situations and related medication (Rescue Act 379/2011).
6 Aims of the Study

This study had two overall aims. The first was to investigate the implementation of medicine education in comprehensive school, and the second to investigate existing guidelines and practices of medication management in the school context using an ecological approach as a theoretical framework.

The specific objectives were:

1. To study how medicine education is implemented in comprehensive schools, and to explore the teaching of topics related to illnesses and medicines and the factors at the organizational and intrapersonal levels affecting the teaching of these topics (I).

2. To determine the associations between teachers’ beliefs about medicines and their teaching of topics related to illnesses and medicines, and further, to examine other explanatory factors at the intrapersonal level affecting the teaching of these topics (II).

3. To discover whether schools have guidelines for medication management, and to explore medication administration practices and the factors at different system levels associated with these practices (III)
7 Materials and Methods

7.1 STUDY DESIGN

In this thesis, a postal survey method was used to explore the research questions. The study population consisted of those comprehensive school teachers who most commonly teach health education in Finnish comprehensive schools. Data was collected using a structured questionnaire consisting of both structured and open-ended questions. First, the survey method was chosen, to determine how medicine education is implemented in schools, to test the hypothesis that teacher’s beliefs about medicines influence the content of medicine education (Hämeen-Anttila et al. 2006a), and to obtain results that can be generalized to the study population of interest. Second, the aim was establish whether schools nationwide have guidelines for medication management and to explore medication administration practices in Finnish comprehensive schools. For this research questions the study design was explorative in nature.

Quantitative univariate and multivariate methods were used to explore the implementation of medicine education and teaching of topics relating to illnesses and medicines, and relationships between variables. Themes and specific questions concerning medicine education were developed by the research group according to earlier studies (Hämeen-Anttila et al. 2005, 2006, 2006). The main themes were the implementation of medicine education and teaching and teachers’ willingness to teach the topic. To explore the actual content of medicine education, the specific topics related to illnesses and medicines were also assessed. In total five subparts containing 15 topics were formed to cover all important aspects of the issue, i.e. teaching about short- and long-term illnesses, basic knowledge of what medicines are and the prerequisites for the rational use of medicines. The topics relating to the incorrect use of medicines were also included, because these are among the most common topics in health education (Aira et al. 2009). Beliefs about medicines were assessed using a questionnaire on general beliefs about medicines (BMQ General) validated in the UK (Horne et al. 1999, Horne et al. 2001). This questionnaire was chosen, because there is no validated instrument in Finnish. The questionnaire has been previously used in countries such as Sweden in many studies and has shown good validity (Jörgensen et al. 2006, Mårdby at al. 2007, Hedenrud et al. 2008). The subparts and topics related to illnesses and medicines are presented in detail in Table 3 and the subparts of the BMQ General in Table 4.

The second main aim was to explore guidelines and practices in Finnish comprehensive schools, and teachers’ perceptions about them. The research questions raised form the international literature presented in Chapters 4.3 and 5.2, and national discussion and debate about schools’ and teachers’ responsibilities for giving medicines to pupils during the school day (Puustinen 2009, Keskustelua 2009). In the analysis both quantitative and qualitative methods were used. Quantitative univariate methods were used to explore the existence of guidelines and practices, and relationships between variables. Qualitative inductive content analysis was applied to analyse teachers’ answers to the open-ended questions, which were used to gather more information about teachers’ ideas about the issue and concrete practices existing in schools. In order to better understand the phenomenon, quantitative information was merged with the results obtained from the qualitative analysis. Thus, for this research question, the embedded mixed methods approach was used in the interpretation and discussion of the results (Creswell and Plano Clark 2011). A summary of outcome measures and methods of analysis is presented in Table 2.
7.2 STUDY POPULATION AND DATA COLLECTION

A nationwide postal survey was carried out in April-June 2010. The study population consisted of a stratified random sample of 1700 comprehensive school teachers: 700 class teachers in primary schools and 1000 subject teachers in lower secondary schools (Figure 6). The distribution of the sample of lower secondary school teachers was calculated on the basis of the findings from the study of health and welfare promotion in comprehensive schools (Aira et al. 2007). According to this study, teachers of physical education, home economics and biology most commonly teach health education (78%, 56% and 49%, respectively). These teachers were therefore selected for this study, and the random stratified sample of 1000 lower secondary school teachers consisted of teachers of physical education (44%, n=437), home economics (30%, n=302), and biology (26%, n=261).

The study population was selected from members of teachers’ national trade unions and associations. The trade unions and associations were contacted by e-mail and asked to supply a list of their members with the name, age and home address of each member. However, not all were able to provide the age of their members. This sampling method was used because in Finland there is a high rate of trade union organization of teachers (95%) (Ministry of Employment and the Economy 2011). The sample size of 1700 was considered by a statistician to be representative assuming that a response rate of 50% would be achieved.

Data was collected using a structured four-page questionnaire consisting of 22 questions both structured and open-ended (Appendix 2 and 3). The questionnaire, together with a covering letter (Appendix 1) and prepaid envelope, was sent to each teacher’s home address. In total 1700 questionnaires were sent (Figure 7). Of these questionnaires, 36 were sent as duplicates to the same teachers as they were members of two trade unions. Thus, the final sample size was 1664, from which 928 teachers returned the questionnaire, yielding a total response rate of 56%. Questionnaires were returned as follows: 534, 784 and 928 after the 1st, 2nd and 3rd rounds, respectively. From these 928 respondents, 690 were teaching or had taught health-related subjects, and returned the completed questionnaire. Twenty-three of these questionnaires were not included because the respondent was not teaching in a comprehensive school or was not working as a teacher at that time. Thus, the participants consisted of 667 teachers, of whom 334 were primary school and 333 lower secondary school
teachers. Lower secondary school participants consisted of 123 teachers of home economics, 107 of physical education and 103 of biology.

The differences in gender and regional distribution between respondents, sample and target population are shown in Table 1. In terms of gender, females were overrepresented (p =0.05). Detailed information on the study participants is available in original publications I-III.
Table 1. Representativeness of the study population.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Respondents % (n)</th>
<th>Sample % (n)</th>
<th>Target population% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary school teachers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>18 (61)*</td>
<td>20 (143)*</td>
<td>24 (3336)</td>
</tr>
<tr>
<td>Female</td>
<td>82 (273)*</td>
<td>80 (557)*</td>
<td>76 (10512)</td>
</tr>
<tr>
<td>Province</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lapland</td>
<td>5 (15)</td>
<td>4 (30)</td>
<td>4 (507)</td>
</tr>
<tr>
<td>Oulu</td>
<td>11 (36)</td>
<td>10 (73)</td>
<td>12 (1654)</td>
</tr>
<tr>
<td>Eastern Finland</td>
<td>13 (43)</td>
<td>11 (76)</td>
<td>11 (1460)</td>
</tr>
<tr>
<td>Western Finland</td>
<td>39 (129)</td>
<td>39 (275)</td>
<td>39 (5454)</td>
</tr>
<tr>
<td>Southern Finland</td>
<td>33 (111)</td>
<td>35 (246)</td>
<td>35 (4773)</td>
</tr>
<tr>
<td><strong>Lower secondary school teachers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>17 (58)**</td>
<td>25 (246)</td>
<td>24 (1333)</td>
</tr>
<tr>
<td>Female</td>
<td>83 (275)**</td>
<td>75 (754)</td>
<td>76 (4174)</td>
</tr>
<tr>
<td>Province</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lapland</td>
<td>2 (8)</td>
<td>3 (32)</td>
<td>4 (192)</td>
</tr>
<tr>
<td>Oulu</td>
<td>13 (42)</td>
<td>12 (116)</td>
<td>11 (589)</td>
</tr>
<tr>
<td>Eastern Finland</td>
<td>13 (43)</td>
<td>12 (119)</td>
<td>12 (655)</td>
</tr>
<tr>
<td>Western Finland</td>
<td>35 (116)</td>
<td>37 (374)</td>
<td>37 (2058)</td>
</tr>
<tr>
<td>Southern Finland</td>
<td>37 (124)</td>
<td>36 (359)</td>
<td>37 (2013)</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001, 2-sample test for equality of proportions with continuity correction, *Data obtained from registers of the national trade unions of teachers.

7.3 CONTENT OF THE QUESTIONNAIRE

The questionnaire contained the following four sections: teaching of medicine education, perceived skills of teaching illnesses and medicine-related topics and the teaching of these topics, beliefs about medicines and medication management practices, and background information on the respondent and the respondent’s school. The questionnaire was first pilot-tested with a convenience sample of 100 teachers. Participants were asked to evaluate the clarity and comprehensiveness of the questions and the readability of the questionnaire. Minor modifications were made according to the feedback obtained.

Table 2 presents the outcome measures, independent variables, analysis and statistics used in this thesis. Each section is described in more detail in the following chapters.
Table 2. Description of the outcome measures, independent variables, and analysis and statistics used in the original publications (I-III) and unpublished results.

<table>
<thead>
<tr>
<th>Publication</th>
<th>Outcome measures</th>
<th>Independent variables</th>
<th>Analysis and statistics</th>
</tr>
</thead>
</table>
| I           | The implementation rate of medicine education in comprehensive schools | For all teachers:  
- gender  
- age and teaching experience  
- use of prescription medicines  
- having any children  
- experience of medicating own child’s long-term illness  
For lower secondary school teachers:  
- teacher group  
- qualification in health education | Quantitative analysis  
- Chronbach’s α  
- Proportions  
- Pearson’s Chi-square  
- Mann-Whitney U  
- Kruskal-Wallis (with Bonferroni correction) |
| II          | Associations between beliefs about medicines and medicine education | For all teachers:  
- gender  
- teaching experience  
- use of prescription medicines  
- having any children  
- experience of medicating own child’s long-term illness  
- perceived skills in teaching topics related to illnesses and medicines  
- Beliefs about Medicines a  
For lower secondary school teachers:  
- teacher group  
- qualification in health education | Quantitative analysis  
- Chronbach’s α  
- Pearson’s Chi-square  
- Mann-Whitney U  
- Kruskal-Wallis (with Bonferroni correction)  
- Principal Component Analysis with direct oblimin rotation  
- Univariate logistic regression  
- Adjusted multivariate logistic regression |
| III         | The existence of guidelines and practices for medication management in comprehensive schools | For all teachers:  
- gender  
- teaching experience  
- use of prescription medicines  
- having any children  
- experience of medicating own child’s long-term illness  
- size of the school  
- regional distribution  
- Beliefs about Medicines a | Quantitative analysis  
- Proportions with 95% confidence interval  
- Pearson’s Chi-square  
- Mann-Whitney U  
- Kruskal-Wallis (with Bonferroni correction) |
| Unpublished | Teachers’ opinions about the illness-and medicines-related topics appropriate to be taught in school and the grade in which medicine education should be started | For all teachers:  
- gender  
- teaching experience  
- use of prescription medicines  
- experience of medicating own child’s long-term illness  
- size of the school  
- regional distribution  
- Beliefs about Medicines a  
For lower secondary school teachers:  
- teacher group  
- qualification in health education | Quantitative analysis  
- Proportions with 95% confidence interval  
- Pearson’s Chi-square  
- Mann-Whitney U |
| Unpublished | Material teachers have used when teaching rational use of medicines | No statistical testing between variables | Qualitative analysis  
- Content analysis for open answers  
- Frequencies |

a Beliefs about Medicines Questionnaire (Horne et al. 1999, Horne et al. 2001)
7.3.1 Outcome measures

The main outcome measures of this study were the implementation rate of medicine education (I), the associations between beliefs about medicines and teaching about medicine education (II), and medication management in comprehensive schools (III) (Table 2).

Medicine education and teaching topics related to illnesses and medicines

Medicine education, i.e. teaching the rational use of medicines, was defined in the questionnaire as: “Rational use of medicines means taking the right medicine for the right symptom/illness, in the proper way, and at the right time. The goal of teaching rational use of medicines is to educate children to become rational medicine users who are able discuss their own medicine use when visiting a physician and in the pharmacy, to be aware of where to seek reliable information about medicines, and finally to become individuals who can gradually take responsibility for their own medication when they grow up.”

Teachers opinions about appropriate topics were sought by asking whether the following should be taught or not: 1) Preventing illnesses through a healthy lifestyle, 2) Preventing illnesses by vaccination, 3) Treating illnesses or symptoms using home remedies, e.g. rest, hot drinks, 4) Treating illnesses or symptoms with over-the-counter (OTC) medicines and 5) Treating illnesses or symptoms with prescription (Rx) medicines. Teachers’ opinions of the grade in which the teaching of rational use of medicines should be started were gathered by asking teachers to select from the following: 1

The implementation rate was measured by asking whether or not the teacher had taught medicine education, and if not, whether she/he would be willing to teach it. The teaching of specific topics related to illnesses and medicines (15 topics), designed by the authors to cover the definition of medicines education (Table 3), was gauged by asking whether the teacher had taught the topic or not. These topics were divided into five subparts scaling from 0 to 3: 1) Short-term illnesses (Short-Ill), 2) Long-term illnesses (Long-Ill), 3) Incorrect use of medicines (Incorrect-Med), 4) Basic knowledge of what medicines are (Know-Med) and 5) Prerequisites for proper use of medicines (Proper-Med).

Table 3. The subparts and topics related to illnesses and medicines with their internal consistency (I).

<table>
<thead>
<tr>
<th>Topic</th>
<th>Primary School (n=334) Cronbach’s $\alpha$</th>
<th>Lower Secondary School (n=333) Cronbach’s $\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term illnesses (Short-Ill)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home remedies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incorrect use of medicines (Incorrect-Med)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dangerous situations in medicine use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dangers of combined use of medicines and alcohol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuse of medicines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term illnesses (Long-Ill)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epilepsy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of what medicines are (Know-Med)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Different purposes of medicines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side-effects of medicines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differences between OTC and Rx medicines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prerequisites for proper use of medicines (Proper-Med)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicine package as an information source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factors that should be known about how to use medicine correctly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questions that could be asked about own medicine of the doctor or in the pharmacy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Further, the sum scores of the subparts were categorized as either taught or not taught. For primary school teachers, a sum score of 0 was categorized as not taught, and scores from 1 to 3 as taught. For lower secondary school teachers, sum scores from 0 to 1 were categorized as not taught, and scores from 2 to 3 as taught. Different categorizations were used because there were major differences in the frequencies in the teaching of the topics. Cronbach’s alpha was used to test the internal consistency, and the values ($\alpha=0.63-0.81$) were considered satisfactory (Metsämuuronen 2009).

Teaching material
Teachers were asked to report the material they have used when teaching the rational use of medicines. Teachers were able to select from the following options: 1) Study book 2) Self-made material, 3) The Medicine education web-site (lääkekasvatus.fi), 4) Something else. In addition, if teachers reported using some other material, a space for open answers was provided to describe the material in more detail.

Medication management
The existence of guidelines for medication management in the school setting was assessed with the question, “Does your school have guidelines for administering medication to pupils during the school day?” To determine existing practices respondents were asked, “What kind of practices exist in your school?”, which consisted of the four specific questions presented in Figure 8. To describe the existing guidelines in more detail, an additional space was provided.

![Figure 8](image.png)

*Figure 8. Questions in the survey related to medication management guidelines and practices (III).*

7.3.2 Independent variables
Socio-demographic background
The respondent’s gender, age, teaching experience, own prescribed medicine use, and experience of medicating long-term illnesses in their own child/children were used as background variables in all publications. In addition, having any children was used in the first publication, and the size of the school (number of pupils) and regional distribution were used in the third publication. Of the respondents, 82% were women, 80% had children, and 28% of respondents with children had experience of medicating their child’s long-term illness. The mean age was 45 years (SD 10) and mean teaching experience 17 years (SD 10).

In addition, for the lower secondary school teachers, the respondent’s subject specialization (teacher group, i.e. teacher of physical education, home economics, and biology and geography), and qualification in health education were used as background variables (I, II). The qualification in health education was used because all lower secondary school teachers participating in this study were qualified to teach health education on the basis of their teacher education at the time of this study and until 1st August 2012. These
teachers were referred to as having a transition phase qualification (57%). The qualification of health education subject teacher, meaning 60 ETC credits in health sciences at university level, is now a requirement. Teachers who had done or were currently doing these studies in health education were referred to as having a full qualification. In this study, 29% reported having this full qualification. Of these teachers, 50% were physical education, 30% biology and geography, and 20% home economics teachers. Teachers who had taken short courses in health education were recorded as a third qualification group (14% of lower secondary school teachers). Detailed information on socio-demographic background variables is presented in the original publications I (Table 1) and III (Table 1).

**Teachers’ perceived teaching skills**

Teachers’ perceived skills to teach each of the specific topics related to illnesses and medicines (Table 3) were measured by asking the respondents to rate their teachings skills on a five-point Likert scale (Weak=1, Quite weak=2, Can’t say=3, Quite good=4 and Good=5). Five subparts corresponding to the subparts of the specific topics related to illnesses and medicines, i.e. Short-Ill, Long-Ill, Incorrect-Med, Know-Med and Proper-Med, were formed. For each subpart, means were calculated ranging from one to five. A higher mean indicated stronger perceived skills in teaching the subpart in question. Cronbach’s alpha was used to test the internal consistency of combined variables, and the values \( \alpha=0.75–0.88 \) were considered satisfactory (Metsämuuronen 2009). Detailed information about perceived teaching skills is presented in original publication II (Table 2). However, the correct mean values (SD) of Short-Ill teaching skills are 4.10 (0.65) for primary school and 4.25 (0.62) for lower secondary school teachers, and 4.17 (SD) in total.

**Beliefs about Medicines**

Beliefs about medicines were assessed using the General part of the Beliefs about Medicines Questionnaire (BMQ General) consisting of 12 statements divided into three subparts (Table 4) (Horne et al. 1999, Horne et al. 2001). The statements were translated from English into Finnish by the research group and back-translated into English in order to check whether or not the Finnish translation conveyed the original meaning of the statements. The back-translation was done by a native English speaker who had lived in Finland for over 40 years and speaks Finnish fluently. Finally, the back-translation was approved by the original author of the questionnaire (Professor Horne).

The respondents were asked to indicate their degree of agreement with the statements on a five-point Likert scale (Strongly disagree=1, Disagree=2, Uncertain=3, Agree=4 and Strongly agree=5). For each subpart, means were calculated ranging from one to five. A higher mean indicated stronger belief about the concept described. Cronbach’s alpha was used to test the internal consistency of combined variables, and the values \( \alpha=0.68–0.82 \) were considered satisfactory (Metsämuuronen 2009). Detailed information about perceived teaching skills is presented in the original publications II (Table 2) and III (Table 1).
Table 4. The subparts of the BMQ General and the statements they include. Means and Cronbach’s α values of subparts for primary and lower secondary school teachers (N=667) (II).

<table>
<thead>
<tr>
<th>Subpart</th>
<th>BMQ Benefita</th>
<th>BMQ Overuseb</th>
<th>BMQ Harmb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary School (n=334)</td>
<td>Lower Secondary School (n=333)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cronbach’s α</td>
<td>Cronbach’s α</td>
<td>Cronbach’s α</td>
</tr>
<tr>
<td>BMQ Benefita</td>
<td>0.73</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>Without medicines doctors would be less able to cure people</td>
<td>Medicines help many people to live better lives</td>
<td>Medicines help many people to live longer</td>
<td>In most cases the benefits of medicines outweigh the risks</td>
</tr>
<tr>
<td>BMQ Overuseb</td>
<td>0.77</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>Doctors use too many medicines</td>
<td>Doctors place too much trust on medicines</td>
<td>If doctors had more time with their patients they would prescribe fewer medicines</td>
<td></td>
</tr>
<tr>
<td>BMQ Harmb</td>
<td>0.68</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>People who take medicines should stop their treatment for a while every now and again</td>
<td>Most medicines are addictive</td>
<td>Medicines do more harm than good</td>
<td>Natural remedies are safer than medicines</td>
</tr>
</tbody>
</table>

aHorne R et al. 2001, bHorne R et al. 1999

A Principal Component Analysis (PCA) revealed identical patterns for all subparts between the Finnish and the original scale. According to these results, the internal consistency and scale structure of the Finnish translation were shown to be comparable with the original BMQ General. The statistical analysis is described in more detail in the next chapter.

7.4 DATA MANAGEMENT AND ANALYSIS

For the mailing and reminder procedure, the randomly sampled names and addresses were entered into an Excel datasheet. Each recipient was designated a code number which was printed in the questionnaire. When the questionnaire was returned, the code was checked and the corresponding recipient’s information was removed. In this way it was not possible to connect the questionnaires with the recipients’ information at any later stage, and the respondents were not sent undue reminders. For the data processing and management, a number was added to questionnaires designating the order they arrived. In this way it was possible to check the correctness of the data entered with the original questionnaires.

Quantitative analysis

The quantitative data was processed using the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) versions 19.0 (I, II) and 21 (III). Frequencies, percentages (unpublished results) and Pearson’s χ2-tests (I, II, III) were used to describe the results and the associations between categorical variables. Combined variables were formed for teaching about topics related to illnesses and medicines (I), and beliefs about medicines (II). Cronbach’s alpha was used to test the internal consistency of combined variables, and the α-value >0.60 was considered satisfactory (Metsämuuronen 2009). The normality of the combined variables was explored using the Kolmogorov-Smirnov test. The non-parametric Mann-Whitney U-test and Kruskal-Wallis test were used to determine differences in values for combined variables between categorical variables (I, II, III, unpublished results). The Bonferroni correction was used in pairwise comparisons. A p-value of <0.05 was considered statistically significant (I, II, III).

Univariate logistic regression analysis was used to analyse the simple associations between teachers’ beliefs about medicines and their teaching about topics related to illnesses
and medicines; multivariate logistic regression analysis was used to measure this association adjusted for explanatory variables. Prior to the regression analyses, interdependencies for the socio-demographic background variables were evaluated. Due to the strong correlation between age and teaching experience (Pearson correlation coefficient $r=0.90$ for primary and lower secondary school teachers), only teaching experience was included in the models. No other strong interdependencies were found.

A Principal Component Analysis (PCA) with direct oblimin rotation was conducted to examine the structure of the Beliefs about Medicines Questionnaire. A Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett’s test for sphericity were used to examine the appropriateness of the PCA. Components with Eigenvalues over 1 were extracted. The PCA of BMQ General items resulted in three-component structure solutions for both primary and lower secondary school teacher samples, confirming the scale structure of the questionnaire (Harm, Overuse and Benefits).

Qualitative analysis

The qualitative data, i.e. the answers to open questions, were analysed using principles of content analysis (Elo and Kyngäs 2008) (unpublished results). For publication III, the inductive approach was used, because the former knowledge of the phenomenon is fragmented, and we did not have any previous study according to which to structure the analysis. The process contained three phases: 1) preparation phase, 2) organizing phase and 3) reporting the analysis process and the results. The preparation phase means selecting the unit of analysis and reading the data. The open answers were short sentences, thus the unit of analysis was a sentence. The data was read through several times to get familiar with the data and to gain an overall understanding of the content. In the second phase, the data were open coded, which means writing notes in the margins while reading. The notes were collected on to coding sheets and notes were grouped to form meaningful sub-categories containing similar or related items. The sub-categories were further grouped to form main categories. This process of grouping data and formulation of a general description of the research topic is called as abstraction. Further, the sub-categories and main categories formed were quantified and tabulated.

The document and text processing program Word (Microsoft Office 2013) was used in forming coding sheets and categories. After creation of the categories, the data were quantified and analyzed using SPSS. The results of the qualitative and quantitative data analyses were combined at the point of interpreting and presentation of the results (III). Results were presented according to ecological systems theory to conceptualize the environment and the challenges teachers face when dealing with medication in schools.

7.5 ETHICAL CONSIDERATIONS

The study setting and study design were in accordance with the local and national ethical instructions for researchers (National Advisory Board on Research Ethics 2002). The covering letter described the rationale of the study and emphasized that participation in the survey was anonymous and voluntary. Returning the questionnaire was considered to signify informed consent. Complete anonymity of the respondents was ensured in the study. Approval from the ethics board is not required for a questionnaire survey.
8 Results

8.1 TEACHERS’ VIEWS ABOUT MEDICINE EDUCATION (UNPUBLISHED RESULTS)

The majority (84%) of primary and approximately half (56%) of lower secondary school teachers thought that teaching the rational use of medicines should be started at primary school (Table 5). Moreover, 43% of primary and 22% of lower secondary school teachers thought that grades 1–4 (7–10-year olds) were appropriate to start medicine education. There was no statistically significant association between background variables and teachers’ opinions as to when teaching should be started.

Table 5. Opinions of primary and lower secondary school teachers about the grades suitable for starting to teach the rational use of medicines.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Primary School (n=334)</th>
<th>Lower Secondary School (n=333)</th>
<th>Total (N=667)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
<td></td>
</tr>
<tr>
<td>1st–2nd</td>
<td>17 (13–21)</td>
<td>5 (3–7)</td>
<td>11 (9–13)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>3rd–4th</td>
<td>25 (21–31)</td>
<td>17 (13–21)</td>
<td>21 (18–24)</td>
<td>0.01</td>
</tr>
<tr>
<td>7th–8th</td>
<td>12 (9–16)</td>
<td>36 (31–41)</td>
<td>24 (21–27)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>9th and later or not at all</td>
<td>5 (3–7)</td>
<td>7 (4–10)</td>
<td>6 (4–8)</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

2-sample test for equality of proportions with continuity correction was applied

All primary and lower secondary school teachers thought that preventing illnesses through a healthy lifestyle and treating illnesses or symptoms using home remedies should be taught in schools (Appendix 4). Correspondingly, the majority of both primary and lower secondary school teachers reported that preventing illnesses by vaccination should also be taught (83% and 94%, respectively). However, approximately half of primary school teachers considered that teaching about the treatment of illnesses or symptoms with over-the-counter (OTC) medicines (51%) and prescription (Rx) medicines (46%) was appropriate. The corresponding frequencies for lower secondary school teachers were considerably higher (77% and 71 %, respectively).

Primary school teachers with the longest teaching experience were most likely to consider that the topics of vaccination and Rx medicines should be taught (Appendix 4). Teachers who considered that medicines are something harmful, and that doctors overprescribe medicines were least likely to consider vaccination and Rx medicines proper topics (Appendix 5). Among lower secondary school teachers, the teachers of home economics were least likely to approve teaching about vaccination and OTC medicines (Appendix 4). Teachers with a full qualification in health education were more likely to consider that topics related to both OTC and Rx medicines are suitable for teaching in schools than teachers who had done short courses in health education or who had a transition phase qualification. Teachers who believed in the beneficial aspects of medicines were more likely to consider that the topics of vaccination and Rx medicines should be part of health education than teachers who considered medicines less beneficial or those who regarded them as harmful (Appendix 5).
8.2 IMPLEMENTATION OF MEDICINE EDUCATION AND TOPICS RELATED TO ILLNESSES AND MEDICINES (I, II)

Medicine education was taught by 34% of primary and 68% of lower secondary school teachers (Table 6). A fifth of primary and a tenth of lower secondary school teachers reported that they had not taught, nor were willing to teach, medicine education.

**Table 6.** The implementation of medicine education with statistically significant background variables.

<table>
<thead>
<tr>
<th>Background variable</th>
<th>Yes, I have taught</th>
<th>No, I haven’t but I’m willing to teach</th>
<th>No, I haven’t and I’m not even willing to teach</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary school teachers (n=334)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching experience, years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤5</td>
<td>32 (27–37)</td>
<td>51 (46–56)</td>
<td>17 (13–21)</td>
<td>0.011</td>
</tr>
<tr>
<td>16–25</td>
<td>27 (22–32)</td>
<td>42 (37–47)</td>
<td>31 (26–36)</td>
<td></td>
</tr>
<tr>
<td>≥26</td>
<td>48 (42–53)</td>
<td>30 (25–35)</td>
<td>22 (18–26)</td>
<td></td>
</tr>
<tr>
<td>Experience of medicating own child’s long-term illness (n=260)</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No</td>
<td>29 (23–35)</td>
<td>47 (41–53)</td>
<td>24 (19–29)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>53 (45–59)</td>
<td>25 (20–30)</td>
<td>21 (16–26)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34 (29–39)</td>
<td>42 (37–47)</td>
<td>24 (19–29)</td>
<td></td>
</tr>
<tr>
<td>Lower secondary school teachers (n=333)</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Teacher group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Education</td>
<td>78 (74–82)</td>
<td>20 (16–24)</td>
<td>3 (1–5)</td>
<td></td>
</tr>
<tr>
<td>Biology</td>
<td>73 (68–78)</td>
<td>19 (15–23)</td>
<td>8 (5–11)</td>
<td></td>
</tr>
<tr>
<td>Home Economics</td>
<td>55 (49–60)</td>
<td>26 (21–31)</td>
<td>20 (16–24)</td>
<td></td>
</tr>
<tr>
<td>Qualification in health education</td>
<td></td>
<td></td>
<td></td>
<td>0.001</td>
</tr>
<tr>
<td>Full qualification (≥60 ETC credits)</td>
<td>81 (77–85)</td>
<td>18 (14–22)</td>
<td>1 (0–2)</td>
<td></td>
</tr>
<tr>
<td>Short courses in health sciences (≤15 ETC credits)</td>
<td>67 (62–72)</td>
<td>22 (18–25)</td>
<td>11 (8–14)</td>
<td></td>
</tr>
<tr>
<td>Transition-phase qualification</td>
<td>61 (56–66)</td>
<td>23 (18–28)</td>
<td>16 (12–20)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>68 (63–73)</td>
<td>22 (18–26)</td>
<td>11 (8–14)</td>
<td></td>
</tr>
</tbody>
</table>

Among primary school teachers, the teaching of medicine education was most common among those with over 26 years of teaching experience, and teachers who had experience of medicating their own children’s long-term illnesses. Correspondingly, among lower secondary school teachers, the teaching of medicine education was most common among physical education teachers and teachers with the full qualification in health education.

The topics short-term illnesses, long-term illnesses and incorrect use of medicines were the most commonly taught among both primary (79%, 36% and 41%, respectively) and lower secondary school teachers (87%, 75% and 72%, respectively). Topics related to medicines, i.e. knowledge of what medicines are and prerequisites for the proper use of medicines, were the least extensively taught among both primary (21% and 11%, respectively) and lower secondary school teachers (48% and 35%, respectively). Both primary and lower secondary school teachers reported their greatest skills were in teaching about short-term illnesses and poorest in teaching about what medicines are.

8.2.1 Associations for primary school teachers

The topics long-term illnesses, knowledge of what medicines are and prerequisites for the proper use of medicines were taught most commonly by teachers with experience of medicating their own children’s long-term illnesses (Table 7).
Table 7. Univariate and multivariate logistic regression analyses of factors associated with teaching of specific topics related to illnesses and medicines among primary school teachers (n=334).

<table>
<thead>
<tr>
<th>Model I: Short-Ill</th>
<th>OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching experience, years</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>≤5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6–15</td>
<td>2.62 (0.85–8.02)</td>
<td>3.41 (0.85–13.70)</td>
</tr>
<tr>
<td>16–25</td>
<td>4.02 (1.10–14.63)</td>
<td>4.25 (0.88–20.59)</td>
</tr>
<tr>
<td>≥26</td>
<td>9.47 (1.8–47.85)</td>
<td>36.62 (3.40–394.94)</td>
</tr>
<tr>
<td>SKILL-Short-Ill</td>
<td>3.73 (2.0–7.04)***</td>
<td>5.21 (2.17–12.52)***</td>
</tr>
</tbody>
</table>

Model II: Long-Ill

| Teaching experience, years | ** | n.s. |
| ≤5 | 1 | n.s. |
| 6–15 | 1.35 (0.64–2.84) | n.s. |
| 16–25 | 2.19 (1.02–4.69) | n.s. |
| ≥26 | 3.17 (1.49–6.77) | n.s. |
| Experience of medicating own child’s long-term illness | ** | n.s. |
| No | 1 | n.s. |
| Yes | 2.19 (1.23–3.90) | n.s. |
| SKILL-Long-Ill | 3.37 (2.51–4.53)*** | 2.89 (2.10–3.97)*** |
| BMQ Harm | 0.66 (0.44–0.996) | n.s. |

Model III: Incorrect-Med

| BMQ-Overuse | 0.70 (0.50–0.96)* | n.s. |
| SKILL-Incorrect-Med | 2.83 (2.10–3.80)*** | 2.89 (2.10–3.97)*** |

Model IV: Know-Med

| Experience of medicating own child’s long-term illness | * | * |
| No | 1 | 1 |
| Yes | 1.92 (1.11–3.32) | 2.17 (1.12–4.20) |
| BMQ Harm | 1.79 (1.06–3.02)* | n.s. |

Model V: Proper-Med

| Experience of medicating own child’s long-term illness | *** | * |
| No | 1 | 1 |
| Yes | 2.95 (1.59–5.48) | 2.24 (1.10–4.58) |
| SKILL-Know-Med | 2.74 (1.85–4.06)*** | 3.09 (1.95–4.89)*** |

*p<0.05, **p<0.01, ***p<0.001; n.s.=not significant; *adjusted for respondent’s gender, teaching experience, use of prescription medicine, experience of medicating own child’s long-term illness, and teaching skills; BMQ=Beliefs about Medicines Questionnaire; Teaching: Short-term illnesses; Long-term illnesses, Incorrect use of medicines, What medicines are, Prerequisites for proper use of medicines.

In addition, short-term and long-term illnesses were more commonly taught by teachers with over 26 years of teaching experience than by less experienced teachers. Teachers who considered medicines as something harmful were least likely to teach about long-term illnesses, while teachers who thought doctors overprescribe medicines were least likely to teach about the incorrect use of medicines.

Multivariate logistic regression analysis revealed a significant association between views about the harmful effects of medicines and teaching pupils about what medicines are (Table 7). This teaching was most likely to be given by those teachers who considered medicines as something harmful. In addition, teachers’ experience of medicating their own children’s long-term illnesses remained associated with teaching pupils about what medicines are and prerequisites for their proper use. High perceived teaching skills were associated with teaching of all topics related to illnesses and medicines.

8.2.2 Associations for lower secondary school teachers

Teachers with the transition phase qualification were less likely to teach all the specific topics related to illnesses and medicines, except the incorrect use of medicines, than teachers with the full qualification or those who had taken short courses in health sciences (Table 8).
Table 8. Univariate and multivariate logistic regression analyses of factors associated with teaching of specific topics related to illnesses and medicines among lower secondary school teachers (n=333).

<table>
<thead>
<tr>
<th>Model I: Short-Ill</th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate* OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualification in health education</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Transition-phase qualification</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>Full qualification (≥60 ETC credits)</td>
<td>3.96 (1.34–11.76)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Short courses in health sciences (≤15 ETC credits)</td>
<td>7.28 (0.95–54.90)</td>
<td>n.s.</td>
</tr>
<tr>
<td>SKILL-Short-Ill</td>
<td>10.54 (4.73–23.49)***</td>
<td>16.84 (5.79–48.99)***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model II: Long-Ill</th>
<th>Qualification in health education</th>
<th>***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transition-phase qualification</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>Full qualification (≥60 ETC credits)</td>
<td>4.00 (2.03–7.89)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Short courses in health sciences (≤15 ETC credits)</td>
<td>2.16 (0.97–4.79)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Teacher group</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Home Economics</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Physical Education</td>
<td>4.06 (2.07–7.96)</td>
<td>2.99 (1.07–8.32)</td>
</tr>
<tr>
<td>Biology</td>
<td>2.21 (1.22–3.99)</td>
<td>2.89 (1.29–6.45)</td>
</tr>
<tr>
<td>SKILL-Long-Ill</td>
<td>4.73 (3.15–7.10)***</td>
<td>4.63 (2.95–7.26)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model III: Incorrect-Med</th>
<th>Qualification in health education</th>
<th>**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transition-phase qualification</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Full qualification (≥60 ETC credits)</td>
<td>3.79 (2.24–6.40)</td>
<td>4.39 (1.93–9.99)</td>
</tr>
<tr>
<td>Short courses in health sciences (≤15 ETC credits)</td>
<td>2.64 (1.33–5.25)</td>
<td>2.30 (0.85–6.24)</td>
</tr>
<tr>
<td>Teacher group</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Physical Education</td>
<td>2.76 (1.59–4.81)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Biology</td>
<td>1.28 (0.74–2.21)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Home Economics</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>SKILL-Incorrect-Med</td>
<td>3.68 (2.56–5.26)***</td>
<td>3.50 (2.37–5.18)***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model IV: Know-Med</th>
<th>Qualification in health education</th>
<th>**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transition-phase qualification</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Full qualification (≥60 ETC credits)</td>
<td>2.45 (1.44–4.17)</td>
<td>4.78 (2.09–10.90)</td>
</tr>
<tr>
<td>Short courses in health sciences (≤15 ETC credits)</td>
<td>2.56 (1.27–5.14)</td>
<td>1.77 (0.66–4.72)</td>
</tr>
<tr>
<td>Teacher group</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Physical Education</td>
<td>6.97 (4.45–10.93)***</td>
<td>8.90 (5.12–15.49)***</td>
</tr>
<tr>
<td>Biology</td>
<td>1.58 (0.60–4.12)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Home Economics</td>
<td>3.01 (1.05–8.66)</td>
<td>n.s.</td>
</tr>
<tr>
<td>SKILL-Know-Med</td>
<td>11.81 (3.25–43.01)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model V: Proper-Med</th>
<th>Qualification in health education</th>
<th>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transition-phase qualification</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Full qualification (≥60 ETC credits)</td>
<td>2.45 (1.44–4.17)</td>
<td>4.78 (2.09–10.90)</td>
</tr>
<tr>
<td>Short courses in health sciences (≤15 ETC credits)</td>
<td>2.56 (1.27–5.14)</td>
<td>1.77 (0.66–4.72)</td>
</tr>
<tr>
<td>Teacher group</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Physical Education</td>
<td>5.50 (3.55–8.52)***</td>
<td>7.17 (4.18–12.28)***</td>
</tr>
<tr>
<td>Biology</td>
<td>1.27 (0.49–3.30)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Home Economics</td>
<td>1.83 (0.67–5.00)</td>
<td>n.s.</td>
</tr>
<tr>
<td>SKILL-Prop-Med</td>
<td>7.80 (2.34–25.93)</td>
<td></td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001; n.s.=not significant; *adjusted for respondent’s gender, teaching experience, use of prescription medicine, experience of medicating own child’s long-term illness, and teaching skills; BMQ=Beliefs about Medicines Questionnaire; Teaching:*Short-term illnesses; †Long-term illnesses, ‡Incorrect use of medicines, ‡Basic knowledge of what medicines are, §Prerequisites for proper use of medicines.
Physical education teachers were more likely to teach about long-term illnesses, the incorrect use of medicines and about what medicines are than the other subject teachers.

Multivariate logistic regression analysis revealed a significant association between teaching experience and teaching pupils about what medicines are and prerequisites for the proper use of medicines (Table 8). These topics were most likely to be taught by teachers who had over 26 years of teaching experience and who had completed the full qualification in health education. The univariate and multivariate logistic regression analyses did not detect any associations between teachers’ beliefs about medicines and the teaching of topics related to illnesses and medicines.

8.3. MATERIALS USED IN TEACHING THE RATIONAL USE OF MEDICINES (UNPUBLISHED RESULTS)

Almost all teachers who reported having taught medicine education answered the questions about the material they have used when teaching medicine education (n=109 for primary, and n=222 lower secondary school teachers). The material used most used was study books (65% for primary and 78% for lower secondary school teachers). Thirty per cent of primary and 37% of lower secondary school teachers reported using self-made material, while 43% and 31% respectively, used some other material. Only 2% of primary school teachers and 15% of lower secondary school teachers reported using a medicine education web-site.

All teachers who reported using something else material wrote short answers to the open-ended question, and the answers were coded in ten categories (Figure 9). Half of the primary school teachers reported using material gained through their own experience and knowledge, 16% reported using extra material in study books, and 10% using material from printed media. Only 2% reported using material from pharmacies. For lower secondary school teachers, the main sources for material were web-sites, pharmacies, printed media and extra material in study books (28%, 26%, 22% and 22%, respectively).

Figure 9. The categories coded from answers to question of what material teachers have used when teaching medicine education if they reported using something else material. Frequencies (%) for primary and lower secondary school teachers. Teacher’s answer could be coded in several categories.
8.4 GUIDELINES AND PRACTICES FOR MEDICINE ADMINISTRATION (III)

The majority of both primary and lower secondary schools teachers reported that their school had guidelines for medicine administration (73% and 76%, respectively). Among primary schools, teachers in the smallest schools (62%, \( p = 0.015 \)) reported the existence of guidelines the least, the reported existence increasing with school size. Teachers who had experience of a long-term illness in their own children reported the existence of guidelines more often than teachers with no such experience (86% and 68%, respectively, \( p = 0.007 \)). For lower secondary school teachers no statistically significant differences were found.

All teachers who reported that their schools had guidelines for medicine administration wrote additional comments to the open-ended question to describe the practices existing in their school in more detail (n=243 for primary and n=253 for lower secondary school teachers). During the qualitative analysis, four main categories were found describing the content of the answers: 1) A description of practices dealing with medicine administration, 2) A description of guidelines for dealing with long-term illnesses, 3) A description of guidelines in general, and 4) A description of practices for dealing with painkillers (Table 9). Several sub-categories were also found.

Most of the teachers stated that they are not responsible for medicine administration and are not allowed to give medicines to pupils (58% of primary and 74% of lower secondary school teachers) (Table 9). Of these teachers, some said that the administration of medication to pupils is prohibited by law, while many said that guidelines from professional unions restrict medication administration to health care professionals. Teachers reported that they do not receive any instruction about medicines or medicine administration during their teacher education, and consequently are neither able nor allowed to participate in medication management. On the other hand, in the open answers 19% of primary (n=243) and 17% of lower secondary school teachers (n=253) reported that their school had guidelines for long-term illnesses/emergency situations, of which diabetes was the most commonly mentioned by primary school teachers, and allergy and anaphylaxis by lower secondary school teachers (Table 9).

The majority of both primary and lower secondary school teachers reported that a school nurse administers medicines to pupils when needed (82% and 98%, respectively) (Table 10). Among primary school teachers the practice was least likely in the smallest schools, the reported frequency increasing with the number of pupils. However, 44% of primary and 31% of lower secondary school teachers reported that there is a medicine cabinet at school from which teachers can provide pupils with medicines, e.g. for headache. At primary schools, teachers with the longest teaching experience were most likely to report the practice. Among both primary and lower secondary schools the practice was most likely in the smallest schools, and least likely in Southern Finland. In the open answers, 35% of primary and 9% of lower secondary school teachers said they administer medicines to pupils according to parents’ instructions and case-specific permissions or guidelines, whether verbal or written (Table 9).
Table 9. Main categories and sub-categories coded from open-ended answers to the question, "Does your school have guidelines for medicine administration to pupils during a school day". Frequencies (%) for primary and lower secondary school teachers.

<table>
<thead>
<tr>
<th>Yes, we have guidelines for medicine administration to pupils during the school day</th>
<th>Primary School (n=243)</th>
<th>Lower Secondary School (n=253)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of practices dealing with medicine administration*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teachers are not allowed to administer medicines</td>
<td>35</td>
<td>24</td>
</tr>
<tr>
<td>Only school nurses are allowed to administer medicines</td>
<td>17</td>
<td>45</td>
</tr>
<tr>
<td>Pupils and parents alone are responsible for medicine administration</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Description of guidelines for dealing with long-term illnesses**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>We have guidelines for long-term illnesses/emergency situations</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>For diabetes</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>For epilepsy</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>For allergy and anaphylaxis</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>For asthma</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>For other illnesses (e.g. ADHD, heart failure)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Identified person in charge</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Description of guidelines in general**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents’ permission and guidelines</td>
<td>23</td>
<td>4</td>
</tr>
<tr>
<td>Case-specific guidelines</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>School nurse’s guidelines</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Written guidelines</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Medicines administered are recorded</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Description of guidelines and practices for dealing with painkillers**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>We have guidelines for administration of painkillers</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Teacher can give painkillers with parent’s permission</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Painkiller is given according to package leaflets</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Painkiller given is paracetamol/ibuprofen</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Headmaster/secretary/porter can administer painkillers</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Painkiller administered is recorded</td>
<td>2</td>
<td>11</td>
</tr>
</tbody>
</table>

*For this main category each teacher’s answer was coded only in one sub-category.
**For this main category each teacher’s answer could be coded in several sub-categories.

The need for parental permission to bring medicines to school was reported by 82% of primary and 17% of lower secondary school teachers (Table 10). Teachers in lower secondary schools who had experience of medicating their own children’s long-term illnesses reported that parental permission is not needed more often than teachers with no such experience. However, a ‘do not know’ category emerged from the answers, and 21% of lower secondary school teachers did not know whether permission is needed or not. Lower secondary school teachers also said they were uncertain whether only pupils with long-term illnesses are allowed to have medicines at school (18%), teachers in the biggest schools being the most uncertain about the existence of this practice. Among both primary and lower secondary schools, teachers who considered medicines as something harmful were most likely to report the practice.
Table 10. Existence of practices of medicine administration with statistically significant differences for primary and lower secondary school teachers (N=667).

<table>
<thead>
<tr>
<th></th>
<th>Primary School (n=334)</th>
<th>Lower Secondary School (n=333)</th>
<th>Do not knowa% (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parent’s permission needed to bring medicines to school</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes % (95% CI)</td>
<td>82 (78-86)</td>
<td>17 (13-22)</td>
<td>61 (56-67)</td>
</tr>
<tr>
<td>No % (95% CI)</td>
<td>19 (16-23)</td>
<td>29 (24-34)</td>
<td>18 (14-22)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>15 (11-19)</td>
<td>29 (24-34)</td>
<td>18 (14-22)</td>
</tr>
<tr>
<td>Male</td>
<td>28 (23-32)</td>
<td>21 (17-26)</td>
<td>12 (9-16)</td>
</tr>
<tr>
<td>Experience of medicating own child’s long-term illness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>20 (16-24)</td>
<td>56 (50-61)</td>
<td>25 (18-29)</td>
</tr>
<tr>
<td>Yes</td>
<td>11 (8-15)</td>
<td>11 (8-15)</td>
<td>12 (12-18)</td>
</tr>
<tr>
<td><strong>School nurse administers medicines to pupils when needed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes % (95% CI)</td>
<td>82 (77-86)</td>
<td>98 (97-100)</td>
<td>2 (0.4-3)</td>
</tr>
<tr>
<td>School size, number of pupils</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 99/≤299</td>
<td>52 (47-57)</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>100-299/300–499</td>
<td>85 (80-89)</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>300 ≥/500 ≥</td>
<td>95 (93-98)</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td><strong>There is a medicine cabinet in our school from which teachers can give medicine to pupils</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>44 (38-49)</td>
<td>31 (26-36)</td>
<td>69 (64-74)</td>
</tr>
<tr>
<td>School experience, years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 5</td>
<td>34 (29-39)</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>6–15</td>
<td>41 (36-47)</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>16–25</td>
<td>36 (31-42)</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>≥ 26</td>
<td>57 (52-63)</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>School size, number of pupils</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>primary/lower secondary schools</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 99/≤299</td>
<td>67 (62-72)</td>
<td>43 (37-48)</td>
<td>56 (52-63)</td>
</tr>
<tr>
<td>100-299/300–499</td>
<td>44 (39-50)</td>
<td>29 (24-34)</td>
<td>71 (66-76)</td>
</tr>
<tr>
<td>300 ≥/500 ≥</td>
<td>29 (24-34)</td>
<td>20 (16-24)</td>
<td>80 (76-84)</td>
</tr>
<tr>
<td>Province</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lapland and Oulu</td>
<td>44 (39-50)</td>
<td>29 (24-34)</td>
<td>71 (66-76)</td>
</tr>
<tr>
<td>Eastern Finland</td>
<td>49 (43-54)</td>
<td>39 (34-44)</td>
<td>61 (56-66)</td>
</tr>
<tr>
<td>Western Finland</td>
<td>58 (53-63)</td>
<td>40 (35-46)</td>
<td>60 (54-65)</td>
</tr>
<tr>
<td>Southern Finland</td>
<td>26 (21-31)</td>
<td>20 (16-25)</td>
<td>80 (75-84)</td>
</tr>
<tr>
<td><strong>Only pupils with long-term illnesses are allowed to have medicines at school</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes % (95% CI)</td>
<td>65 (59-70)</td>
<td>32 (27-37)</td>
<td>50 (44-55)</td>
</tr>
<tr>
<td>School size, number of pupils</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 99/≤299</td>
<td>n.s.</td>
<td>34 (29-39)</td>
<td>17 (13-22)</td>
</tr>
<tr>
<td>100–299/300–499</td>
<td>n.s.</td>
<td>33 (28-38)</td>
<td>12 (8-15)</td>
</tr>
<tr>
<td>300 ≥/500 ≥</td>
<td>n.s.</td>
<td>26 (21-30)</td>
<td>29 (24-34)</td>
</tr>
<tr>
<td>BMQ Generalb (Scale 1–5)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Yes/No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overuse</td>
<td>3.44 (0.68)</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Harm</td>
<td>2.30 (0.56)</td>
<td>2.27 (0.57)</td>
<td>2.07 (0.54)</td>
</tr>
<tr>
<td></td>
<td>2.16 (0.53)</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

*a*p<0.05, **p<0.01, ***p<0.001; *A ‘do not know’ category emerged from the answers for lower secondary school teachers; n.a.=not applicable, n.s.=not significant.
8.5 SUMMARY OF THE RESULTS

The implementation rate for medicine education was 34% for primary and 68% for lower secondary school teachers. The topics of short-term illnesses, long-term illnesses and incorrect use of medicines were the most commonly taught among both primary and lower secondary school teachers (Figure 10). Topics related to medicines were the least extensively taught among both primary and lower secondary school teachers.

Figure 10. Teaching frequencies for topics related to illnesses and medicines for primary and lower secondary teachers.

The main results for the factors associated with teaching specific topics related to illnesses and medicines are summarized in Figure 11. Teaching experience, perceived teaching skills, subject specialization, training in health education, and experience of, and beliefs about medicines were found to be associated with the teaching of these topics.

Figure 11. Summary of the main results for teaching of topics related to illnesses and medicines for primary and lower secondary school teachers. The results are presented from the viewpoint of a teacher applying an ecological approach.
The majority of both primary and lower secondary school teachers reported that their school has guidelines for medication management (73% and 76%, respectively). However, in answers to open questions, a majority reported medication administration to be the responsibility of a school nurse and was prohibited for teachers (Figure 12).

**Figure 12.** The existence of guidelines and practices for medication management for primary and lower secondary school teachers.

The main results for factors associated with medication management guidelines and practices are summarized in Figure 13. School size, school location, teaching experience, and experience of, and beliefs about, medicines were found to be associated with medication administration practices.

**Figure 13.** Summary of the results for medication management for primary and lower secondary school teachers. Results are presented from the viewpoint of a teacher applying an ecological approach. *Association for primary school teachers, *b* Association for lower secondary school teachers.
9 Discussion

Medicine education has been part of health education for over a decade in Finland (Hämeen-Anttila 2006), but according to the results of this thesis, its implementation rate is low and it still seems to be a challenging and unfamiliar subject for teachers. Only a minority of teachers had taught topics related to the rational use medicines, although the majority had taught topics related to the incorrect use of medicines. This study confirms the hypothesis generated in a previous qualitative study that teachers’ beliefs about medicines are associated with teaching about the rational use of medicines (Hämeen-Anttila et al. 2006a). The same association was also found with medication administration practices. In addition, it was found that teachers encounter challenges at all system levels of ecological theory when dealing with medication management. In the following chapters the results of this thesis are discussed through these ecological levels.

9.1 NATIONAL AND ORGANIZATIONAL FACTORS

There might be several national and organizational reasons for the low implementation rates for medicine education. Firstly, the national core curriculum did not describe in detail how these topics should be taught. Secondly, the study books generally used in health education instruction mainly contain aspects of the abuse and incorrect use of medicines, while the rational and proper use of medicines is rarely discussed (Hämeen-Anttila and Karjalainen 2008). According to this study the majority of teachers reported using a study book when teaching the rational use of medicines. Thirdly, there might be differences in organizational culture, i.e. an organization’s expectations, experience, philosophy and culture, between schools that affect the implementation of health promotion activities and practices (Bennett et al. 2016). The organizational factors, i.e. location and size of the school, used in this study were not found to be associated with teaching of the rational use of medicines.

According to these findings only a minority of teachers had used medicine education websites as a source of teaching material. However, since this study was conducted, medicines education at school has been widely promoted. Medicine education websites have been provided by the Finnish Medicines Agency since 2012. The importance of medicine education as part of schools’ health education as a way to achieve high health literacy in the general population was recognized in the first National Medicines Information Strategy (Finnish Medicines Agency 2012). In addition, a multidisciplinary study combining the disciplines of pharmacy and applied educational science and teacher education has been conducted with the aim of developing new methods for teaching the proper use medicines and new medicine administration practices. As a result, new medicine education learning environments modelled together with teachers have been designed and added to the material provided by medicine education websites (Hämeen-Anttila et al. 2013). Further, giving a medicine education lesson according to the material and assignments provided on medicine education websites in a local comprehensive school has been part of pharmacy students’ internship for three years (Hämeen-Anttila and Rytikönen 2014). This project is a part of collaboration within the national multidisciplinary medicines information network (Finnish Medicines Agency 2012). To evaluate this project, pharmacy students, pharmacists and teachers have been asked to give their views and perceptions about medicine education cooperation. So far unpublished results show that such collaboration is viewed positively by all participants. In light of these promotion activities, it can be assumed that today teachers are more knowledgeable about medicine education, its objectives and the material available for instruction than in 2010 when this survey was conducted. Thus, it can also be assumed that
today the implementation rate for medicine education is higher than in 2010 when this survey was conducted.

According to the findings of this thesis, teachers were uncertain about the laws and guidelines concerning medication management in the school context at both national and organizational levels. In addition, organizational factors, i.e. school size and location, were shown to influence medication administration practices. Teachers in the smallest schools were more likely to be involved in medication administration than those in the biggest schools. Teachers in the biggest lower secondary schools were more likely to be uncertain about existing guidelines than teachers in the smallest schools. However, it has also been shown that even teachers in the same school report different guidelines and medication administration practices (Siitonen et al. 2016). Obviously, this should not be the case. The equality and safety of both teachers and pupils in medicines-related issues should be guaranteed irrespective of organizational factors.

In view of these results, it is crucial to produce clear and consistent guidelines at both national and organizational levels instructing schools how to deal with health and medicines-related issues in children and adolescents. In order to promote medication management in comprehensive schools, a joint project between pharmacy students from the University of Eastern Finland, Kuopio University Hospital and Awanic Ltd. was undertaken in 2014. As a result, commercial eLearning material targeted at schools carrying out medication administration practices was created (www.laakeosaaminen.fi) (Saano 2015). In addition by giving medicine education lessons, pharmacists could also play an important role in medication management issues in schools. The role of pharmacists could be to help schools to develop local guidelines for medication management and to train school staff about different health conditions and their proper management. This need for collaboration is well established, and pharmacists are being encouraged to reach out to schools (International Pharmaceutical Federation 2001, 2012). However, there is a paucity of research describing this kind of role for pharmacists (Reutzel and Holtorff 2005, Stegall-Zanation and Scolaro 2010).

9.2 INTERPERSONAL FACTORS

The Health Promoting Schools approach (Langford et al. 2014, Stewart-Brown 2006), the School Well-Being model (Konu and Rimpelä 2002) and the national core curriculum (Finnish National Board of Education 2014) emphasize the importance of engaging students, school personnel and families in promoting health and well-being in schools. According to the findings of this thesis, teachers rely on school nurses in issues concerning medication administration. However, according to national estimates, the recommended ratio of school nurse to pupils is not met, especially in the smallest schools (Wiss et al. 2012). It was also shown in this study that teachers in the smallest schools were less likely to report that school nurses administer medicines to pupils when needed than teachers in the biggest schools. It has also been shown that although a school has a full-time school nurse, teachers have problems in reaching him/her when medication is needed (Siitonen et al. 2016). This is due to the fact that the focus of school nurses’ duty is on preventive work such as physical examinations and screening. Teachers therefore need more support in issues concerning medicines from health care professionals than they are currently receiving. This need for collaboration is well recognized in health education (Turunen et al. 2006) as well as in medication management (Thies and McAllister 2001, Mukherjee et al. 2002, Shaw et al. 2011, Knauer et al. 2015, Langford et al. 2015, Bennett et al. 2016, Siitonen et al. 2016).

The national core curriculum emphasizes cooperation and joint responsibility between families and schools with respect to health and well-being at school (Finnish National Board of Education 2014). It is self-evident that parents are mainly responsible for their child’s or adolescent’s health and overall well-being. But parents are not present at school and responsibility for pupils’ welfare, including medicines-related issues, shifts to the school
staff. Thus, teachers might encounter tasks that are beyond their traditional academic role. According to this study teachers are receiving guidelines from parents about administering medicines, and teachers reported administering medicines to their pupils if they had permission from the pupil’s parents. However, it has been shown that teachers need more comprehensive information from parents about their pupils’ health status and the use of medicines to understand the effects on the classroom (Knauer et al. 2015, Siitonen et al. 2016). Teachers have also reported that parents might not tell them if their child or adolescent is using medication e.g. for depression. This might make it difficult for teachers to take into account the effect of pupil’s illness or medication on school work and well-being. This is a concern, since as presented in the School Well-Being model, health status is an important component of overall well-being in schools (Konu and Rimpelä 2002).

In terms of medicine education, both parents (Sormunen et al. 2013) and teachers seem to be hesitant over whether education about medicines is the school’s responsibility or not. According to the present study, approximately half of primary school teachers were of the opinion that treating illnesses or symptoms with OTC or Rx medicines should not be taught at school. Correspondingly, according to Sormunen et al. (2013), parents believed that teaching about the most common children’s diseases and self-care, and the basic rules for using medicines is mainly or wholly the home’s responsibility. Our findings together with these previous findings indicate that not just teachers but also parents should be instructed about the importance of teaching about illnesses and medicines-related topics as part of health education.

9.3 INTRAPERSONAL FACTORS

Health education is based on skills, attitudes and knowledge (Moynihan et al. 2015). Knowledge covers cultural, philosophical, life-style and methodological aspects (Kannas 2006). Relational, personal and tacit knowledge are reported to be important in teaching about health issues (Paakkari et al. 2010a). It was shown in this thesis, that teachers’ factors at the intrapersonal level, i.e. beliefs, skills and experience about illnesses and medicines-related issues, are significant in terms of teaching about medicines and medication management practices. More specifically, this study confirms the hypothesis generated in a previous qualitative study that teachers’ beliefs about medicines are associated with teaching the rational use of medicines (Hämeeen-Anttila et al. 2006a). It was shown that teachers’ views about the harmful effects of medicines might affect both medication administration practices during the school day and the content of teaching about medicines. Teachers who considered that medicines are something harmful were more likely to report that only pupils with long-term illnesses are allowed to have medicines at school. Teaching basic knowledge of what medicines are was more common among teachers who considered medicines as something harmful than among teachers who regarded medicines as something less harmful.

In light of the positive aspects of the health-promoting school approach, these results are somewhat controversial and raise questions about what is actually happening at school. Are the practices and activities empowering the pupils, i.e. encouraging them to view and use medicines rationally, as it should be, or are they paternalistic, i.e. merely warning about the dangerous aspects of medicines and their use? According to this study, teachers rely mainly on study books when teaching rational use of medicines. This might present major challenges for teaching medicines in empowering way, since aspects related to the rational use of medicines are rarely discussed in study books (Hämeeen-Anttila and Karjalainen 2008). In addition to study books, teachers, in particular primary school teachers, use material which is mainly based on their own experience and knowledge of medicines. In light of the association between teachers’ beliefs about medicines and the teaching of medicines-related topics, this might raise questions about the content of teaching material. This is a concern, since it is argued that medicine education should not be taught together with teaching about the abuse of medicines and the dangerous aspects of medicines use (Bush et al. 1999,
Hämeen-Anttila 2006). By combining these two opposing aspects of medicines, fears and misconceptions related to the proper use of medicines might be created in children.

Instead, medicine education should be seen through a positive and holistic approach. Education based on the principles of a socio-scientific issues (SSI) education, in particular, has been shown to be a meaningful way to learn about issues related to medicines (UEF-PROFILES Working Group, Hämeen-Anttila et al. 2013). A SSI education is based on issues familiar to pupils from everyday life and on learning that emphasizes inquiry and decision-making (Sadler 2011). Handling medicines and illnesses through the principles of SSI education is an appropriate and meaningful way to cover the objectives of medicine education and the national core curriculum’s transversal competence area of taking care of oneself and managing daily life (Finnish National Board of Education 2014).

Teachers’ self-efficacy in the context of health education has been shown to be an important factor (Leurs et al. 2007). Teachers’ personal competence, motivation and perceptions about health programmes have been shown to be the main factors influencing teachers’ commitment to health education (Jourdan et al. 2010). It has been shown that teachers who had received training in health education were more likely to be involved in general health promotion in schools (Jourdan et al. 2011) as well as in more specific areas like sex education (Ramiro and de Matos 2008) and that they also had greater self-perceived competence than untrained teachers (Jourdan et al. 2010). The findings of this thesis also underline the importance of self-perceived competence and training in health education in teaching about illnesses and medicines-related issues. The most significant factor determining the likelihood of primary and lower secondary school teachers teaching issues related to medicines and illnesses was high perceived teaching skills. In addition to good perceived teaching skills, for lower secondary school teachers, other significant factors were subject specialization and qualifications in health education. Medicine education was most commonly taught by physical education teachers, whose teacher education degree includes considerable amounts of health education, and by teachers who had a full qualification in health education. Both primary and lower secondary school teachers reported the highest teaching skills in teaching about short-term illnesses, i.e. flu, headache and home remedies, and about the incorrect use of medicines. However, teachers perceived the poorest teaching skills to be in teaching topics related to knowledge of what medicines are, i.e. the different purposes of medicines, the side-effects of medicines and differences between OTC and Rx medicines. Similar results were found by Kärkkäinen et al. (2014b), who studied teacher students’ perceptions about medicine education.

In addition to their beliefs and skills concerning medicines, teachers’ experience of medicating their own child’s long-term illness was also significantly associated with both teaching about medicines and medication practices. Teachers who had experience of medicating their own child’s long-term illnesses were more likely to report the existence of medication management guidelines in general than teachers with no such an experience. They were also more likely to report that parents’ permission is not needed to bring medicines to school than teachers without that experience. Correspondingly, teachers with this medication experience were more likely to report teaching about medicine education in general and also medicines-related topics than teachers without this experience. Thus, these results suggest that teachers, and primary school teachers in particular, are currently relying on their own experience gained through everyday life in teaching medicine education as well as in medication administration practices. However, this should not be the case. Teachers should be provided with training about illnesses and their proper management to ensure that they possess a sufficient level of relevant knowledge in addition to their own experience gained through everyday life. On the other hand, lower secondary school teachers reported using more material from pharmacies and medicine education website. They also used more web-sites as information sources in general compared to primary school teachers. However, this means that teachers should have tools for assessing the quality of online medicines information, since it has been shown to be highly variable (Närhi et al 2008).
9.4 METHODOLOGICAL CONSIDERATIONS

The aims of the empirical part of this thesis were, first, to investigate the implementation of medicine education, and second, to examine existing medication management guidelines and practices in comprehensive schools and the factors affecting them. The first aim emerged from the previous qualitative study exploring teachers’ views about medicine education, where it was hypothesized that teachers’ beliefs about medicines could influence the way they teach topics related to medicines (Hämeen-Anttila et al. 2006a). Thus, a quantitative research design using a questionnaire survey was selected since there was a need to get results that could be generalized to the study population of interest, i.e. the teachers who most commonly teach health education. The second aim of this study can be considered explorative in nature. This is the first study exploring the issues surrounding medication management in schools in Finland, and this thesis gives descriptive results for this phenomenon. Both quantitative and qualitative analysis methods were used to analyse the data. Qualitative content analysis was applied to analyse teachers’ answers to the open-ended questions, which were used to gather more information about teachers’ ideas about the issue and concrete practices existing in schools. In order to better understand the phenomenon, an embedded mixed methods approach was used in the interpretation and discussion of the results (Creswell and Plano Clark, 2011). Further qualitative studies, not included in this thesis, have been conducted to gain greater understanding of teachers’ perception of medication management guidelines and practices in comprehensive schools (Siitonen et al. 2016).

General aspects of the validity and reliability of a questionnaire survey should be considered. The questionnaire items were developed by the researcher mainly on the basis of previous research results (Hämeen-Anttila 2006) to cover the issues of importance. To ensure the validity of the questionnaire content, i.e. whether all important aspects of the construct are covered, colleagues were asked to review the questionnaire for the clarity and importance of the questions posed. The face validity of the questionnaire, i.e. whether respondents interpret the questions as intended, was explored by means of a pilot study protocol conducted for a convenience sample of 100 teachers. These teachers were asked to say whether they had any difficulty understanding the questions. Minor clarifications were made based on the pilot test. Thus, the pilot protocol confirmed the face validity of the questionnaire. The answers obtained in the pilot test were consistent in a manner, and were considered to show the reliability of the questionnaire. However, no test-retest procedure was used. Beliefs about medicines were measured using a previously validated format to assess cognitive representations of medications (Horne et al. 1999, Horne et al. 2001). The structure obtained and the high internal consistencies of the scales ensured the validity of the instrument in this study. However, it has been stated that one should be cautious when comparing results between different countries and cultures (Granas et al. 2014). However, this was not the aim of this study.

The response rate achieved (56%) can be considered relatively good for this kind of method (Tolonen 2006). However, the low response rate for physical education teachers compared to other teacher groups, i.e. teachers of biology and home economics (24%, 41% and 41%, respectively), was unexpected. In addition, 34% of lower secondary school teachers reported that they are not teaching, or have not taught, health-related issues. This is somewhat surprising, since these are the teachers who most commonly teach these topics (Aira et al. 2009).

The survey consisted of questions concerning the teachers’ own medicine use and experience of medicating a long-term illness in their own child, which might have been considered a sensitive matter, and thus might have lowered the response rate (Edwards et al. 2009). Other factors that might have lowered the response rate were sending the questionnaire to home addresses instead of the workplace and the absence of any pre-contact before posting. The timing of the survey might also have affected the response rate. Although
the timing was planned as carefully as possible considering the school schedule, the second reminder was sent at the beginning of June, and the latest questionnaires were returned by the middle of July. Teachers are naturally busy at the end of May with final exams and marking, and at the time of the second reminder they were already on summer holiday. However, 58% of questionnaires were returned in two weeks after the first mailing.

The study population was selected using random stratified sampling from members of the national professional associations concerned. This sampling method was used because in Finland there is a high rate of trade union organization for teachers. However, because of the possibility of double membership of associations, the same teachers were randomly selected twice, thus lowering the final response rate. A sample size of 1700 was considered representative assuming that a response rate of 50% would be achieved. Analysis showed the study population to be representative of the target population according to its regional distribution. Minor differences were seen in gender, females being over-represented compared to the target population. However, the results did not differ when the genders were analyzed separately. In general, it has been shown that females are more likely to answer surveys than males (Tolonen et al. 2006). In addition, the distribution of respondent’s gender was similar to the results of Aira et al. (2009) studying teachers’ perceptions of health education. Age was not used in the analysis of representativeness since it was not possible to get this information for either the whole study population or the target population.

There may be differences in attitudes concerning medicine education between respondents and non-respondents. Non-respondents could have had a more negative view about medicine education, and also medicines in general, than the respondents. In addition, based on studies concerning the attitudes of the general population towards medicines, and the positive effect of high education on attitudes (Isacson and Bingefors 2002, Mårdby et al. 2007), the participants might have had more positive attitudes towards medicines in general. However, despite this the present study was able to reveal the effect of negative beliefs about medicines both on teachers’ views about proper medicines-related topics to be taught in the classroom, and on the actual teaching of these topics.

This study was conducted six years ago. Since then medicine education has been widely promoted by the Finnish Medicines Agency (Finnish Medicines Agency 2012, Hämeen-Anttila et al. 2013, Hämeen-Anttila and Rytönen 2014). Thus, it might be assumed that the results of this thesis might not reflect the current state of medicine education in schools. In addition, at the time this study was conducted, a model for the care of children with diabetes in the school setting was launched (Ministry of Social Affairs and Health 2010). Thus, nowadays teachers might be better informed about medication management issues concerning diabetes than at the time of this survey. However, according to the semi-structured interviews conducted among teachers in 2013, most of the teachers interviewed were not aware of this model (Siitonen et al. 2016).
10 Conclusions

Based on the results of this study, the following conclusions can be drawn:

1. Teachers reported a fairly high implementation rate for medicine education in general. The actual implementation rate is low since the minority of teachers had taught the specific topics concerning the rational use of medicines, while the majority of teachers had taught the incorrect use. Both primary and lower secondary school teachers reported their greatest skills were in teaching about short-term illnesses and the incorrect use of medicines. The poorest reported teaching skills were in teaching about medicines-related topics. For all illnesses and medicines-related topics lower secondary school teachers perceived their teaching skills to be significantly greater than those of primary school teachers.

2. This study confirms in a quantitative way the hypothesis generated in a previous qualitative study that teachers’ beliefs about medicines are associated with teaching about the rational use of medicines. It was found that teaching basic knowledge of what medicines are was more common among primary school teachers who considered medicines as something harmful than among teachers who regarded medicines as something less harmful. In addition, teachers’ experience of medications increased the teaching of medicines-related topics.

3. Teachers’ perceived good teaching skills were the most significant factor determining the likelihood of teaching medicines-related issues for both primary and lower secondary school teachers. For primary school teachers other significant factors were experience of medicating their own child’s long-term illness and views about the harmful effects of medicines. Correspondingly, for lower secondary school teachers other significant factors were training in health education and long teaching experience.

4. No consistent medication management guidelines exist in Finnish schools, and teachers’ views about medication administration practices vary considerably. Teachers reported uncertainty about both national and local level guidelines. At the local organizational level most of the teachers reported their school had medication management guidelines. However, the majority described guidelines instructing them not to administer medicines to pupils. In addition, at the exosystem level medication administration practices differed according to school size and location. Teachers in the smallest schools were more likely to encounter situations dealing with administration of medicines than teachers in the biggest schools. Practices were also affected by teachers’ experience of, and views about, medicines, i.e. intrapersonal factors.

5. Teacher-related factors at the intrapersonal level, i.e. beliefs, skills and experiences about medicines-related issues, are significant in both teaching about and management of medicines. In particular, primary school teachers are currently relying on their own views about medicines and on experience gained in everyday life in their teaching of medicine education topics and dealing with medication administration practices.
10.1 IMPLICATIONS FOR POLICY AND PRACTICE

Based on the findings of this thesis, the following proposals for policy and practice can be made for promoting medicines-related issues in the school context.

1. **At national level:**
   a. Further promote medicine education as part of health education to increase children’s and adolescents’ health literacy, and thus, skills, knowledge and awareness in medicine-related issues.
   b. Further promote and develop the medicine education website (www.laakekasvatus.fi). Develop material with multidisciplinary collaboration to meet the objectives of the revised national core curriculum. To include topics of the rational use of medicines in study books.
   c. Plan and develop comprehensive medication management guidelines with multi-professional collaboration instructing schools to create their local medication management policies. For this process, international guidelines could be used as references. Such guidelines would include the existing model for diabetes, which describes the formation of an individual health care plan.

2. **At organizational and interpersonal levels:**
   a. Training teachers about medicines-related issues. These issues should be included in teacher education as well as in continuing education. To enhance multi-professional collaboration between schools and health care professionals, e.g. pharmacists, in giving medicine education lessons as well as providing school staff with training about different health conditions and their proper management.
   b. To enhance the preparation of local level policies for medication management. Each school or school district should have a clear policy and practice for managing the administration of medicines. This policy might cover: 1) managing both OTC and Rx medicines, 2) a statement of the roles of and responsibilities of pupils, parents and school staff, 3) training of school staff, 4) drawing up an individual health care plan, 4) administering and handling of medicines, 5) emergency procedures. To develop this local policy, schools need the national level guidance described above.

3. **At the intrapersonal level:** to ensure that teachers possess a sufficient level of relevant knowledge about illnesses and medicines in addition to their experiences gained through everyday life. Teachers need to acknowledge their important role and the rationale of medicines-related issues as part of pupils’ overall well-being in schools. These facts are promoted when the proposals for policy and practice described in points 1–2 are implemented.
10.2 FURTHER RESEARCH

1. For the purpose of planning and developing medication management guidelines at the national level, studies are needed to explore needs and ideas of various actors at the different system levels. To assess this, a research process should be conducted according to which national recommendations could be created and tested. This process should contain the evaluation of current practices, modelling and examining the new model, reflection and consolidating. Interviews and questionnaires for pupils, parents, teachers, school nurses, and school doctors could be used as research methods.

2. In terms of medicine education, studies are needed after the revised national core curriculum is implemented in schools in autumn 2016. In particular, it will be necessary to study the positioning and implementation of medicine education according to the objectives of the curriculum. A mixed method research approach using both qualitative and quantitative research methods could be used to obtain this information. Firstly, interviews could be used to study teachers’ perceptions of teaching medicine education as part of the revised curricula. This qualitative data could be used to develop a quantitative instrument, such as a questionnaire, to obtain national level and generalizable information.
11 References


Bennett AE, Cunningham C, Johnston Molloy C: An evaluation of factors which can affect the implementation of a health promotion programme under the Schools for Health in Europe framework. Eval Program Plann 57:50–54, 2016.


Edwards PJ, Roberts I, Clarke MJ, DiGuiseppi C, Wentz R, Kwan I, Cooper R, Felix LM, Pratap S: Methods to increase response to postal and electronic questionnaires. Cochrane Database of Systematic Reviews (3) 2009.


Finnish Medicines Agency (FIMEA): Lääkekasvatuksen ydinsisälöitä/keskeiset käsitteet OPS 2016 mukaisten ympäristö- ja luonnontiedon (1–6-luokat) ja terveyystiedon (1–7-luokat) keskeisten sisältöalueiden mukaisesti [The core contents of medicine education]. Available at: www.laakekasvatus.fi/documents/721715/881773/L%C3%A4%C3%A4kekasvatuksen+ydinsis%C3%A4l%C3%B6%C3%B6nt+OPS+2016+tavoitteiden+mukaisesti+sek%C3%A4+linkitys+l%C3%A4%25C3%25A4kekasvatussivuihin.pdf/577fc088-2abe-4c27-b7c9-0e0d1619c950 [Accessed 1.2.2016].


Sepponen K: Lasten lääkkeiden käyttö ja siihen liittyvät ongelmat lasten ja vanhempien näkökulmasta. Kuopio, University of Eastern Finland, Dissertations in Health Sciences, 2011.


Siponen S: Children’s health, self-care and the use of self-medication, University of Eastern Finland, Dissertations in Health Sciences, 2014.


Stewart-Brown S: What is the evidence on school health promotion in improving health or preventing disease and, specifically, what is the effectiveness of the health promoting schools approach? Copenhagen, WHO Regional Office for Europe, 2006.


Tolonen H: Towards the high quality of population health surveys, University of Kuopio, Publications of the National Public Health Institute, 2006.


Hyvä opettaja,

Tutkimme lääkkeiden oikean käytön opettamista ala- ja yläkoulujen terveysopetussa. Voimassa olevissa perusopetuksen opetussuunnitelmien perusteissa lääkkeiden oikean käytön opettaminen eli lääkekasvatus on osa alakoulujen ympäristö- ja luonnontieto sekä yläkoulun terveydyys-oppiaineita.

Lääkkeiden oikealla käytöllä tarkoitamme sitä, että oikea lääke otetaan oikeaan vaivaan, oikealla tavalla ja oikeaan aikaan. Lääkkeiden oikean käytön opetuksen avulla pyritään kasvattamaan lasta järkeväksi lääkkeiden käyttäjäksi, keskustelemaan aktiivisesti lääkkeisiin liittyvistä asioista esimerkiksi lääkärissä ja apteekkissa, sekä hakemaan luotettavaa tietoa lääkkeestään. Tavoitteena on, että lapsi ja nuori oppii vähitellen ottamaan vastuuta lääkityksestäan.

Kyselymme on lähetetty 1700 satunnaisesti valitulle ala- ja yläkoulun opettajalle. Osoitetiedot on saatu opettajien ammattiyhdistysten rekistereistä (Luokanopettajaliitto, Liikunnan ja Terveystedon Opettajat, Biologian ja maantieteen opettajien liitto, Kotitalousopettajien liitto sekä OAJ).


Vastauksesi on erittäin tärkeä. Tutkimuksen tuloksia hyödynnetään opettajien perus- ja täydennyskoulutuksessa sekä lääkekasvatussivuston kehittämisessä (www.uku.fi/laakekasvatus).

Yhteistyöstä kiitäen,

Katri Hämee-Anttila   Piia Siitonen
Professori (ma.), tutkimusryhmän johtaja   Proviisori, tutkija
puh. 040 355 2675   puh. 040 355 3118
katri.hameen-anttila@uef.fi   piia.siitonen@uef.fi
Voit kirjoittaa tähän
- kyselylomakkeen vastauksia täydentävää tietoa tai
- muita ajatuksia lääkkeiden oikean käytön opettamisesta.

Kiitos!
KYSELY LÄÄKKEIDEN OIKEAN KÄYTÖN OPETTAMISESTA

Opetatko tai oletko opettanut terveyteen liittyviä asioita?

1. En → ole hyvä ja palauta kyselylomake tyhjänä oheisessa palautuskuoressa
2. Kyllä

   a. alakoulussa, missä oppiaineissa?
   __________________________________________________________

   b. yläkoulussa, missä oppiaineissa?
   __________________________________________________________

   → ole hyvä ja vastaa kyselyymme ja palauta kyselylomake täytettynä oheisessa palautuskuoressa

Vastaa kysymyksiin rengastamalla sopivat vastausvaihtoehdot tai kirjoittamalla vastauksesi sitä varten varattuun tilaan.

LÄÄKKEIDEN OIKEAN KÄYTÖN OPETTAMINEN

Lääkkeiden oikea käyttö = oikea lääke, oikeaan vaivaan, oikealla tavalla, oikeaan aikaan. Lääkkeiden oikean käytön opetuksen avulla pyritään kasvattamaan lasta järkeväksi lääkkeiden käyttäjäksi, keskustelemaan aktiivisesti lääkkeisiin liittyvistä asioista esimerkiksi lääkärisä ja apteekissa, sekä hakemaan luotettavaa tietoa lääkkeestään. Tavoitteena on, että lapsi oppii vähitellen ottamaan vastuuta lääkityksestään.

1. Tulisiko mielestäsi koulussa opettaa seuraavia sairauksien ehkäisyyn ja hoitoon liittyviä asioita:

   Sairauksien ehkäisy terveellisillä elämäntavoilla?
   1. Ei
   2. Kyllä

   Sairauksien ehkäisy rokotuksin?
   1. Ei
   2. Kyllä

   Sairauksien tai oireiden hoito koti- ja vaikuttamattomilla ilman lääkkeitä, esimerkiksi lepo, lämmin juoma?
   1. Ei
   2. Kyllä

   Sairauksien tai oireiden hoito ilman reseptiä saatavilla itsehoidotlääkkeillä?
   1. Ei
   2. Kyllä

   Sairauksien tai oireiden hoito lääkärin määräämällä reseptilääkehallilla?
   1. Ei
   2. Kyllä

2. Millä luokka-asteella opetus lääkkeiden oikeasta käytöstä tulisi mielestäsi aloittaa?
   1. 1–2-luokalla
   2. 3–4-luokalla
   3. 5–6-luokalla
   4. 7–8-luokalla
   5. 9 luokalla, tai sen jälkeen
   6. Ei lainkaan

3. Oletko opettanut lääkkeiden oikeaan käyttöön liittyviä asioita?
   1. Kyllä (vastaa kysymykseen 4)
   2. En, enkä haluaisikaan (siirry kysymykseen 5)
   3. En, mutta olisin valmis opettamaan (siirry kysymykseen 5)

4. Mitä materiaalia olet käyttänyt opettaessasi lääkkeiden oikeaan käyttöön liittyviä asioita? (Voit valita useita vaihtoehdetta)
   1. Oppikirjaa, mitä?
   2. Itse tekemääni materiaalia
   3. Lääkke kasvatussivusto (www.uku.fi/laakekasvatus)
   4. Muuta materiaalia, mitä?

   __________________________________________________________
   __________________________________________________________
5. Arvioi valmiuksiasi opettaa lapsille alla olevia aiheita. Merkitse myös jokaisen rivin loppuun, oletko opettanut aihetta.

<table>
<thead>
<tr>
<th>Aihe</th>
<th>Hyvät</th>
<th>Melko hyvät</th>
<th>Valmiudet opettaa</th>
<th>Melko en osaa sanoa</th>
<th>Huonot</th>
<th>Olen opettanut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flunssa</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Päänsärky</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Epilepsia</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Astma</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Kotikonstien merkitys sairauksien hoidossa</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lääkkeiden erilaiset käyttötarkoitukset (ehkäistä, lievittää, parantaa)</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Millaisia asioita omasta lääkkeestä on tiedettävä, että osaa käyttää sitä oikein</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Resepti- ja itsehoitolääkkeiden erot</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lääkkeiden haittavaikutukset</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Millasta tietoa lääkepakkausesta löytyy</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mitä lääkäri on ja apteekissa kannattaa kysyä omasta lääkkeestä</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lääkkeisiin liittyvät vaaratilanteet</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Alkoholin ja lääkkeiden sekakäytön vaarat</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lääkkeet päähymismielessä</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

NÄKEMYKSIÄ LÄÄKKKEIDEN KÄYTÖSTÄ

6. Ympyröi mielipidettäisi lähinnä oleva vaihtoehto seuraavista lääkkeisiin liittyvistä väittämistä.

<table>
<thead>
<tr>
<th>Väittämä</th>
<th>Täysin samaa mieltä</th>
<th>Samaa mieltä</th>
<th>Epävarma</th>
<th>Eri mieltä</th>
<th>Täysin eri mieltä</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lääkärit määräävät liian paljon lääkkeitä</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lääkärit luottavat lääkkeisiin liikaa</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Jos lääkäreillä olisi enemmän aikaa potilaalle, he määräisivät vähemmän lääkkeitä</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lääkkeet aiheuttavat enemmän haittaa kuin hyötyä</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Kaikki lääkkeet ovat myrkyjyä</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Luontaisuotot ovat turvallisempia kuin lääkkeet</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lääkkeitä käyttävien ihmisten kannattaisi välillä pitää taukoa lääkkeiden käytössä</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Suurin osa lääkkeistä aiheuttaa riippuvuutta</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Ilman lääkkeistä lääkärit eivät pystyisi hoitamaan ihmisiä yhtä hyvin</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lääkkeet auttavat monia ihmisiä elämään parempaa elämää</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lääkkeet auttavat monia ihmisiä elämään pidempään</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Yleensä lääkkeiden hyödyt ovat suuremmat kuin niiden riskit</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
7. Syntymävuotesi: ____________________

8. Sukupuolesi
   1 Nainen
   2 Mies

9. Missä asut, vanhan läänijaon mukaan?
   1 Lapin läänissä
   2 Oulun läänissä
   3 Itä-Suomen läänissä
   4 Länsi-Suomen läänissä
   5 Etelä-Suomen läänissä
   6 Ahvenanmaalla


11. Mikä on virkanimikkeesi tällä hetkellä?
   1 Terveytiedon lehtori
   2 Terveytiedon tuntiopettaja
   3 Liikunnan lehtori
   4 Liikunnan ja terveytiedon lehtori
   5 Kotitalouden lehtori
   6 Historian- ja yhteiskuntaopin lehtori
   7 Biologian lehtori
   8 Biologian ja maantiedon lehtori
   9 Luokanopettaja
   10 Psykologian lehtori
   11 Muu, mikä? ___________________________________

12. Onko sinulla jokin terveytiedon opettajan koulutus tai -kelpoisuus?
   1 Ei
   2 Kyllä, millainen? → Ympyröi seuraavasta listasta

   Olen siirtymäkauden ajan terveytiedon opetuksen pätevä aineenopettaja (biologian, liikunnan, kotitalouden, yhteiskuntaopin tai lukioissa psykologian opettajan pätevyys) 1 2
   Olen suorittanut terveytiedon täydennyskoulutuskurssin/-kurseja (3–5 opintovihkoa / 5–8 opintopistettä) 1 2
   Suoritan paraaikaa terveytiedon aineenopettajapätevyyttä (35 opintovihko / 60 opintopisteä terveytiedon opinnot) 1 2
   Olen suorittanut terveytiedon aineopinnot (vähintään 35 opintovihkoa / 60 opintopistettä) 1 2
   Olen suorittanut terveytiedon aineopettajakelpoisuuden antavat muut vastaavat opinnot (esim. liikuntahygienian ja kansanterveyden tai kansanterveystieteeseen cum lauden) 1 2
   Muu, mikä? _____________________________________ 1 2

13. Käytätkö säännöllisesti jotakin lääkärin määräämää lääkettä?
   1 Ei
   2 Kyllä

14. Onko sinulla lapsia?
   1 Ei
   2 Kyllä. Onko sinulla kokemusta lasten pitkäaikaissairauden lääkitsemisestä lääkkeillä?  
     1 Ei
     2 Kyllä

15. Kuinka monta oppilasta on koulussasi? ___________

16. Mille luokka-asteelle opetat terveyteen liittyviä asioita?

17. Onko koulussasi useita opettajia, jotka opettavat terveyteen liittyviä asioita?
   1 Kyllä
   2 Ei

18. Onko koulussasi ohjeet lääkkeiden antamisesta oppilaille koulupäivän aikana?
   1 Ei
   2 En osaa sanoa
   3 Kyllä, millaiset ohjeet? __________________________

19. Millaisia toimintatapoja koulussasi on?

   Vain pitkäaikaissaairalla lapsilla saa olla omia lääkkeitä koulussa 1 2
   Lääkkeen mukana pitämiseen tarvitaan vanhemman lupa 1 2
   Koulussa on lääkekaappi, josta opettaja voi antaa oppilaille esimerkiksi päänsärkylääkkeen 1 2
   Kouluterveydenhoitaja huolehtii oppilaiden lääkitsemisestä tarvittaessa 1 2
   Muita toimintatapoja, mitä? ____________________________ 1 2

   Mitään yhteistä toimintatapaa ei ole sovittu 1 2
20. Mistä kuulit lääkekasvatussivustosta?
1. Kollegalta
2. Ammattilihedestä
3. Löysin itse Internetistä
4. Apteekista
5. Täydennyskoulutuksesta, mistä?
6. Muulta, mistä?

21. Ympyröi mielipidettäsi lähinnä oleva vaihtoehto seuraavista lääkekasvatussivuihin liittyvistä väittämistä.

<table>
<thead>
<tr>
<th>Väittämä</th>
<th>Täysin samaa mieltä</th>
<th>Jokseenkin samaa mieltä</th>
<th>En osaa sanoa</th>
<th>Jokseenkin eri mieltä</th>
<th>Täysin eri mieltä</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lääkekasvatussivusto on selkeä ja helppokäyttöinen</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sivuston ulkoasu on miellyttävä</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sivustolla on vaikea liikku</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sivustolla on liikaa tietoa</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Oppituntien suunnittelu on liian tarrutti tuntisuunnitelmien motiivien</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Tuntisuunnitelmat ovat selkeät</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Tuntisuunnitelmat ovat liian tarrutti tuntisuunnitelman perusteiden</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Oppilaile suunnatut valmiit tehtävät sopivat hyvin luokka-asteelle,</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>jota opetan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tehtävien oppimistavoitteet ovat selkeät</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Tehtävien toteutus vaati ottaa hyvin valmistelutyööitä</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Tehtävät ovat vaikea viedä käytäntöön</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Tehtävät ovat tärkeä ja ymmärrettävät</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lääkekasvatussivusto vastasi odotuksiani</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sivustoa vastaa opetuussuunnitelman perusteiden tavoitteita</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>


________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Kiitos!
Appendix 3.
Questionnaire of teaching the rational use of medicines

University of Eastern Finland
Faculty of Health Sciences
School of Pharmacy, Social Pharmacy
April 2010

SURVEY OF TEACHING THE RATIONAL USE OF MEDICINES

Are you teaching or have you taught health-related issues?

1. No  ➔ please, return the questionnaire empty in the attached envelope
2. Yes
   a. in primary school, in which subjects? _______________________________________
   b. in lower secondary school, in which subjects? _________________________________

➔ please, answer the survey and return the completed questionnaire in the attached envelope

TEACHING OF RATIONAL USE OF MEDICINES

Rational use of medicines = taking the right medicine for the right symptom/illness, in the proper way, and at the right time.
The goal of is to educate children to become rational medicine users who are able discuss their own medicine use when visiting a physician and in the pharmacy, to be aware of where to seek reliable information about medicines, and finally to become individuals who can gradually take responsibility for their own medication when they grow up.

1. Should the following issues relating to preventing and treating of illnesses be taught in the school:

   Preventing illnesses by healthy lifestyle?
   1. No
   2. Yes

   Preventing illnesses by vaccination?
   1. No
   2. Yes

   Treating illnesses or symptoms by home remedies, i.e. rest, hot drinks?
   1. No
   2. Yes

   Treating illnesses or symptoms by OTC-medicines?
   1. No
   2. Yes

   Treating of illnesses or symptoms by Rx-medicines?
   1. No
   2. Yes

2. On what grade the teaching of rational use of medicines should be started at?
   1. 1–2 –grade (7–8 years)
   2. 3–4 –grade (9–10 years)
   3. 5–6 –grade (11–12 years)
   4. 7–8 –grade (13–14 years)
   5. 9 grade, or after (15- years)
   6. Not at all

3. Have you taught issues relating rational use of medicines?
   1. Yes, I have (answer question 4)
   2. No, I haven’t and I’m not even willing to teach (go to question 5)
   3. No, I haven’t but I’m willing to teach (go to question 5)

4. What material you have used when teaching rational use of medicines? (You can select many options)
   2. Self-made material
   3. Medicine education web-site (www.uku.fi/lääkekasvatus)
   4. Something else, what? ________________________________
5. Evaluate your skills to teach following issues. Also mark out at the end of every row, if you have taught the issue.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Good</th>
<th>Pretty good</th>
<th>Uncertain</th>
<th>Rather poor</th>
<th>Poor</th>
<th>I have taught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flu</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Headache</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Diabetics</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Asthma</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Non-pharmaceutical self-care (home remedies)</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Different purposes of medicines (to prevent, to relieve and to cure)</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Things that should be known of own medicine to use it right</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Differences between OTC and Rx- medicines</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Side-effect of medicines</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Medicine package as an information source</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Questions that could be asked about own medicine in the doctor or in the pharmacy</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Dangerous situations in medicine use</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Dangers of combined use of medicines and alcohol</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Abuse of medicines</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
</tbody>
</table>

BELIEFS ABOUT MEDICINES

6. Circle the option which is closest to your opinion of following statements of medicines.

<table>
<thead>
<tr>
<th>Statement</th>
<th>I strongly agree</th>
<th>I agree</th>
<th>Uncertain</th>
<th>I disagree</th>
<th>I strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors use too many medicines</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Doctors place too much trust in medicines</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>If doctors had more time they would prescribe fewer medicines</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Medicines do more harm than good</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>All medicines are poisons</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Natural remedies are safer than medicines</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>People who take medicines should stop their treatment for a while every now and again</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Most medicines are addictive</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Without medicines doctors would be less able to cure people</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Medicines help many people to live better lives</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Medicines help many people to live longer</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>In most cases the benefits of medicines outweigh the risks</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
### Background Information

#### Year of birth

- **Gender**
  - 1. Female
  - 2. Male

- **Province**
  - 1. Lapland
  - 2. Oulu province
  - 3. Eastern Finland
  - 4. Western Finland
  - 5. Southern Finland
  - 6. Åland Islands

- **How long you have been as a teacher?** ___________ years.

- **What is your job title for the moment?**
  - 1. Lecturer of Health Education
  - 2. Fee-paid teacher of Health Education
  - 3. Lecturer of Physical Education
  - 4. Lecturer of Health and Physical Education
  - 5. Lecturer of Home Economic
  - 6. Lecturer of History
  - 7. Lecturer of Biology
  - 8. Lecturer of Biology and Geography
  - 9. Class Teacher
  - 10. Lecturer of Psychology
  - 11. Else, what? ______________________________

### Background Information of Your School

- **How many students is in your school?** ___________

- **On what grade you teach health-related issues?**

- **Does your school have many teachers who teach health-related issues?**
  - 1. Yes
  - 2. No

- **Does your school have guidelines for administering medications to pupils during the school day?**
  - 1. No
  - 2. I do not know
  - 3. Yes, what kind of guidelines exist? ______________________________

- **What kind of practices exist in your school?**
  - Only children with long-term illness may have medicines at school 1 2
  - Parent’s permission is needed to bring a medicine at school 1 2
  - There is a medicine cabinet at school from which teachers can give pupils medicine e.g. for headache 1 2
  - School nurse gives medicines to pupils if needed 1 2
  - Other policies, what? ______________________________

- **Does your school have guidelines for administering medications to pupils during the school day?**
  - 1. No
  - 2. I do not know
  - 3. Yes, what kind of guidelines exist? ______________________________

- **Do you use prescription medicine?**
  - 1. No
  - 2. Yes

- **Do you have any children?**
  - 1. No
  - 2. Yes. Do you have experience of medicating children’s long-term illness? 1 2

- **What kind of practices exist in your school?**
  - Only children with long-term illness may have medicines at school 1 2
  - Parent’s permission is needed to bring a medicine at school 1 2
MEDICINE EDUCATION WEB-SITE (www.uku.fi/laakekasvatus)

Answer to the questions 20, 21 and 22 only if you have used material from the Website or if you have visited the Website (www.uku.fi/laakekasvatus).

20. From where did you heard about the medicine education web-site?

1. From colleague
2. From professional journal
3. I found from the Internet
4. From pharmacy
5. From supplementary education, where? ____________________________
6. Elsewhere, where? ____________________________

21. Circle the option which is closest to your opinion of following statements of medicine education Website.

<table>
<thead>
<tr>
<th>Statement</th>
<th>I strongly agree</th>
<th>I agree</th>
<th>Uncertain</th>
<th>I disagree</th>
<th>I strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website is clear and easy to use</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>The design of the web-site is pleasant</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>It was hard to navigate in the web-site</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Web-site contain too much information</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Web-site contain too little information</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lesson plans motivated me to teach the topic</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lesson plans are clear</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lesson plans are not proper for the age group I teach</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Ready-to-use assignments are proper for the age group I teach</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>The objectives of the assignments are clear</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Using the assignments requires a lot of preliminary work</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>The assignments are not easy to put into practice</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Assignments are not proper for the school work</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Medicine education web-site met my expectations</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>I will recommend the web-site for my colleagues</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Web-site meets the objectives of the national core curricula</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

22. What parts of the web-site need to be improved? How you would improve them?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Thank you!
Appendix 4. Opinions of primary (n=334) and lower secondary school teachers (n=333) about the topics related to illnesses and medicines suitable for teaching in schools with statistically significant background variables.

<table>
<thead>
<tr>
<th></th>
<th>Preventing illnesses through a healthy lifestyle</th>
<th>Treating illnesses or symptoms using home remedies</th>
<th>Preventing illnesses by vaccination</th>
<th>Treating illnesses or symptoms with OTC&lt;sup&gt;a&lt;/sup&gt; medicines</th>
<th>Treating illnesses or symptoms with Rx&lt;sup&gt;b&lt;/sup&gt; medicines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary school teachers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching experience, years</td>
<td>Yes %, (95% Cl)</td>
<td>Yes %, (95% Cl)</td>
<td>Yes %, (95% Cl)</td>
<td>Yes %, (95% Cl)</td>
<td>Yes %, (95% Cl)</td>
</tr>
<tr>
<td>≤5</td>
<td>n.s</td>
<td>n.s</td>
<td>*</td>
<td>n.s</td>
<td>*</td>
</tr>
<tr>
<td>6-15</td>
<td>100 (66-75)</td>
<td>81 (77-85)</td>
<td>72 (67-77)</td>
<td>44 (39-49)</td>
<td>43 (38-48)</td>
</tr>
<tr>
<td>16-25</td>
<td>89 (86-92)</td>
<td>72 (67-77)</td>
<td>43 (38-48)</td>
<td>43 (38-48)</td>
<td>58 (53-63)</td>
</tr>
<tr>
<td>≥26</td>
<td>89 (86-92)</td>
<td>72 (67-77)</td>
<td>43 (38-48)</td>
<td>43 (38-48)</td>
<td>58 (53-63)</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>83 (79-87)</td>
<td>51 (46-56)</td>
<td>46 (41-51)</td>
</tr>
<tr>
<td><strong>Lower secondary school teachers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Education</td>
<td>n.s</td>
<td>n.s</td>
<td>*</td>
<td>*</td>
<td>n.s.</td>
</tr>
<tr>
<td>Biology</td>
<td>94 (91-97)</td>
<td>85 (81-89)</td>
<td>76 (71-81)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Economics</td>
<td>90 (87-93)</td>
<td>76 (71-81)</td>
<td>71 (66-76)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The qualification in health education</td>
<td>n.s</td>
<td>n.s</td>
<td>n.s.</td>
<td>***</td>
<td>**</td>
</tr>
<tr>
<td>Full qualification (≥60 ETC credits)</td>
<td>92 (89-95)</td>
<td>83 (75-87)</td>
<td>83 (75-87)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short courses of health sciences (≤15 ETC credits)</td>
<td>79 (75-83)</td>
<td>70 (65-75)</td>
<td>70 (65-75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transition-phase qualification</td>
<td>69 (64-74)</td>
<td>66 (61-71)</td>
<td>66 (61-71)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>99</td>
<td>94 (91-97)</td>
<td>77 (72-82)</td>
<td>71 (66-76)</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001; n.s.=not significant
Appendix 5. The associations between teachers’ beliefs about medicines (BMQ scale 1–5) and opinions of primary (n=334) and lower secondary school teachers (n=333) about the topics related to illnesses and medicines suitable for teaching in schools.

<table>
<thead>
<tr>
<th></th>
<th>Preventing illnesses through a healthy lifestyle</th>
<th>Treating illnesses or symptoms using home remedies</th>
<th>Preventing illnesses by vaccination</th>
<th>Treating illnesses or symptoms with OTC medicines</th>
<th>Treating illnesses or symptoms with Rx medicines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary school teachers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMQ</td>
<td>Yes/No Mean (SD)</td>
<td>Yes/No Mean (SD)</td>
<td>Yes/No Mean (SD)</td>
<td>Yes/No Mean (SD)</td>
<td>Yes/No Mean (SD)</td>
</tr>
<tr>
<td>Benefit</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td></td>
<td>4.17 (0.56)</td>
<td>4.17 (0.56)</td>
<td>4.17 (0.56)</td>
<td>4.17 (0.56)</td>
<td>4.17 (0.56)</td>
</tr>
<tr>
<td>Overuse</td>
<td>n.s.</td>
<td>n.s.</td>
<td>***</td>
<td>n.s.</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>3.37 (0.71)</td>
<td>3.38 (0.71)</td>
<td>3.31 (0.71)</td>
<td>3.37 (0.71)</td>
<td>3.28 (0.66)</td>
</tr>
<tr>
<td>Harm</td>
<td>n.s.</td>
<td>n.s.</td>
<td>*</td>
<td>n.s.</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>2.25 (0.55)</td>
<td>2.25 (0.55)</td>
<td>2.21 (0.55)</td>
<td>2.25 (0.55)</td>
<td>2.18 (0.56)</td>
</tr>
<tr>
<td><strong>Lower secondary school teachers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMQ</td>
<td>Yes/No Mean (SD)</td>
<td>Yes/No Mean (SD)</td>
<td>Yes/No Mean (SD)</td>
<td>Yes/No Mean (SD)</td>
<td>Yes/No Mean (SD)</td>
</tr>
<tr>
<td>Benefit</td>
<td>n.s.</td>
<td>n.s.</td>
<td>*</td>
<td>n.s.</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>4.18 (0.56)</td>
<td>4.18 (0.56)</td>
<td>4.21 (0.55)</td>
<td>4.18 (0.55)</td>
<td>4.22 (0.55)</td>
</tr>
<tr>
<td>Overuse</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td></td>
<td>3.51 (0.75)</td>
<td>3.51 (0.75)</td>
<td>3.51 (0.75)</td>
<td>3.52 (0.75)</td>
<td>3.51 (0.57)</td>
</tr>
<tr>
<td>Harm</td>
<td>n.s.</td>
<td>n.s.</td>
<td>*</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td></td>
<td>2.16 (0.57)</td>
<td>2.16 (0.57)</td>
<td>2.13 (0.58)</td>
<td>2.15 (0.57)</td>
<td>2.15 (0.57)</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001; n.s.=not significant; BMQ=Beliefs about Medicines Questionnaire
Medicines are part of our everyday lives, including schools. The aim of this thesis was to evaluate the implementation of medicine education, i.e. teaching the rational use of medicines, and the existence of medication management guidelines and practices in schools, and to study factors affecting on both aims. Bronfenbrenner’s ecological systems theory was used to describe the environment of teachers in relation to medicines. This study is based on a survey of Finnish primary and lower secondary school teachers in 2010.