The Challenge of Changing Practice

Applying Theory in the Implementation of an Innovation in Swedish Primary Health Care

Siw Carlfjord

Division of Community Medicine Department of Medical and Health Sciences Linköping University, Sweden



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To my wonderful children, Johanna, Simon and Maria, and in memory of my aunt Ann-Marie Carlfjord (1931-2010)!

To him who devotes his life to science, nothing can give more happiness than increasing the number of discoveries.

But his cup of joy is full when the results of his studies immediately find practical application.

There are not two sciences.

There is only one science and the application of science, and these two activities are linked as the fruit is to the tree.

Louis Pasteur (1822-1895)

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ABSTRACT

Background: The translation of new knowledge, such as research findings, new tools or methods into health care practice has gained increased interest in recent years. Important factors that determine implementation outcome have been identified, and models and checklists to be followed in planning as well as in carrying out an implementation process have been produced. However, there are still knowledge gaps regarding what approach should be used in which setting and for which problems. Primary health care (PHC) in Sweden is an area where there is a paucity of research regarding implementation of new methods into practice. The aim of the thesis was to apply theory in the study of the implementation of an innovation in Swedish PHC, and identify factors that influenced outcome.

Methods: The study was performed using a quasi-experimental design, and included six PHC units, two from each one of three county councils in the southeast part of Sweden. A computer-based lifestyle intervention tool (CLT) developed to facilitate addressing lifestyle issues, was introduced at the units. Two different strategies were used for the introduction, both aiming to facilitate the process: a theory-based explicit strategy and an implicit strategy requiring a minimum of effort. Data collection was performed at baseline, and after six, nine and 24 months. Questionnaires were distributed to staff and managers, and data was also collected from the CLT database and county council registers. The baseline questionnaire included assessment of the organizational climate. Implementation outcome was defined as proportion of eligible patients being referred to the CLT, and was also measured in terms of Reach, Effectiveness, Adoption, Implementation and Maintenance according to the RE-AIM framework. Focus group interviews and individual interviews were performed in order to explore experiences of the implementation process as perceived by staff and managers. Both inductive and deductive methods were used for the analysis of data.

Results: A positive organizational climate seemed to promote implementation. Organizational changes or staff shortages coinciding with the implementation process had a negative influence on outcome. The explicit implementation strategy seemed to be more effective than the implicit strategy in the short

term, but the differences levelled out over time. The adopters' perceptions of the implementation seemed to be influenced by the existing professional subcultures. An inductive analysis found that managers were visionary regarding the implementation of the CLT, general practitioners were reluctant, nurses were open and nurse assistants showed indifference. The deductive analysis showed that successful implementation was associated with positive expectations, perceptions of the innovation being compatible with existing routines and perceptions of relative advantage. A general perception about the CLT was that the lifestyle assessment was too limited, which might be an explanation for the overall low rates of implementation.

Conclusions: The general conclusion is that when theory was applied in the implementation of a lifestyle intervention tool in Swedish PHC, factors related to the adopters and to the innovation seemed to be more important over time than the strategy used. Staff expectations, perceptions of the innovation's relative advantage and potential compatibility with existing routines were found to be positively associated with implementation outcome, and other major organizational changes concurrent with implementation seemed to affect the outcome in a negative way. Values, beliefs and behaviour associated with the existing sub-cultures in PHC appeared to influence how the implementation of an innovation was perceived by managers and the different professionals.

LIST OF PAPERS

This thesis is based on the following papers, which are referred to in text by their Roman numerals I–V.

- I. Carlfjord S, Andersson A, Nilsen P, Bendtsen P, Lindberg M. The importance of organizational climate and implementation strategy at the introduction of a new working tool in primary health care. *Journal of Evaluation in Clinical Practice* 2010; 16: 1326–1332.
- II. Carlfjord S, Andersson A, Bendtsen P, Nilsen P, Lindberg M. Applying the RE-AIM framework to evaluate two implementation strategies used to introduce a tool for lifestyle intervention in Swedish primary health care. *Health Promotion International* 2011; DOI: 10.1093/heapro/dar016.
- III. Carlfjord S, Lindberg M, Bendtsen P, Nilsen P, Andersson A. Key factors influencing adoption of an innovation in primary health care: a qualitative study based on implementation theory. *BMC Family Practice* 2010; 11: 60.
- IV. Carlfjord S, Andersson A, Lindberg M. Experiences of the implementation of a tool for lifestyle intervention in primary health care: a qualitative study among managers and professional groups. *BMC Health Services Research* 2011; 11:195.
- V. Carlfjord S, Lindberg M, Andersson A. Sustained use of a tool for lifestyle intervention implemented in primary health care: A 2-year follow-up. *Journal of Evaluation in Clinical Practice* (In press).

TERMS AND CONCEPTS

A number of terms and concepts are used in implementation research in ways that are not always in agreement. In the following, the concepts are explained according to how they have been used in the thesis, some with references to the literature. A few concepts are used in distinct ways in the thesis, depending on how they are described in the models and frameworks applied.

Adopter: An individual, group or organization who makes the decision to make use of an innovation.

Adoption: A decision to make full use of an innovation (Rogers 2003). Adoption may occur at an individual, group, or organizational level. Adoption is also one of the RE-AIM dimensions used for evaluation.

Change agent: An individual who acts to influence the decision to adopt an innovation, in a direction deemed desirable by a change agency, for example an enterprise or a research team (Rogers 2003).

Conceptual framework/conceptual model: Terms used synonymously for sets of concepts and the propositions that integrate them into meaningful configurations (Fawcett 1999).

Diffusion: The process by which an innovation is communicated through certain channels over time among members of a social system (Rogers 2003). Diffusion is substantially a passive process.

Dissemination: The term dissemination can be interpreted as a more or less active process. According to Nutley et al. (2007) dissemination means that research findings are circulated or presented to potential users; Greenhalgh et al. (2005) defines it as a planned active process intended to increase the rate and level of adoption.

Effectiveness: The extent to which an intervention achieves its intended effect on important outcomes in the usual clinical setting.

Efficacy: The extent to which an intervention achieves its intended effect on important outcomes in an experimental setting.

Implementation: Implementation is a concept used in this thesis in distinct ways. Primarily, it describes the entire process of an innovation from its introduction until it is embedded in routine practice or rejected. Where the RE-AIM framework (RE-AIM 2011) is applied, implementation refers to fidelity to the original ideas linked to the innovation. When Rogers' innovation-decision process, which is a step-wise model, is applied, implementation refers to one of the five steps included.

Innovation: An idea, practice or object that is perceived as new by an individual or other unit of adoption (Rogers 2003).

Maintenance: The term is used in the RE-AIM framework (RE-AIM 2011), and refers to the extent to which a program or policy becomes institutionalized or part of the routine. In the thesis the term is used as a RE-AIM dimension measured over time.

Opinion leader: An individual who is able to influence other individuals' attitudes and make them change behaviour.

Organizational culture: The set of shared values that control organizational members' interactions with each other and with people outside the organization (Jones 2010). A reflection of the way things are done in an organization (Verbeke et al. 1998).

Organizational climate: The attitudes, feelings and behaviours that characterize life in an organization (Ekvall 1996). A reflection of the way people perceive and come to describe the characteristics of their environment (Verbeke et al. 1998).

Outcome: In this thesis, outcome is the word used for the results of implementation, meaning the degree to which the innovation has been implemented and adopted.

Sustainability: The extent to which a program or policy becomes embedded or integrated into routine practice after a defined time span.

INTRODUCTION

The translation of new knowledge, such as research findings, new tools or methods, into health care practice is an area that has gained increased interest in recent years. This implementation process, however, has been shown to be slow and unpredictable (Graham et al. 2006).

New knowledge of relevance for health care is produced continuously, but to be of benefit to patients it must also be translated into practice. This is a complex and challenging mission that, according to Fixsen et al. (2005), far outweighs the effort of developing new methods.

It could be argued that new methods that have been proven effective should spread spontaneously, if only people are made aware of them. However, this has been shown not to be the case. From 1601, when Captain James Lancaster discovered that lemon juice prevents scurvy among sailors, it took 264 years until provision of vitamin C became routine on all British navy and merchant marine vessels (Berwick 2003). In 1847 in Vienna, Dr Semmelweis found that hand washing in health care reduced the spread of mortal disease (Nuland 2003). The germ theory was confirmed by Louise Pasteur in 1865, yet poor hand hygiene remains a considerable problem in health care, indicating a slow spread or, in other words, an implementation failure. However, there are also examples of innovations that are not yet evidence-based, but have spread rapidly in health care settings, e.g. motivational interviewing in diabetes care (SBU 2009).

There are a number of examples showing that medical decisions are not always built on what is considered best practice. A literature review performed in the United States found that no more than 50–70% of patients received recommended care and 20–30% received unnecessary care (Schuster et al. 1998). In Sweden, low adherence to national guidelines was found in a study of asthma and chronic obstructive pulmonary disease (COPD) treatment in primary health care (PHC) (Carlfjord & Lindberg 2006). According to Byrnes (2011), who refers to the gap between evidence and practice as therapeutic inertia, the problem is not primarily the availability of effective treatments, but the extension of them to appropriate patients. Grol (2000) suggests that evidence-based guidelines for practice should be complemented

by evidence-based implementation. Despite the obvious difficulties of transferring new knowledge to practical use, in the United States, 99% of medical research funding goes to the development of new methods and only 1% is allocated for the implementation of findings into practice (Pronovost et al. 2004).

Important factors that determine implementation outcome have been identified, and implementation models and checklists to be followed in planning, carrying out and evaluating an implementation process have been produced. A variety of experimental designs have been used to expand knowledge about implementation in health care settings (Trinder 2000, SBU 2011). However, there are still knowledge gaps regarding what approach should be used in which setting and for which problems. In Sweden, several studies on the implementation of guidelines in hospital care have been conducted (Wallin et al. 2000, Bahtsevani et al. 2010, Forsner et al. 2010), but there is still a paucity of research regarding the implementation of guidelines or new methods into practice in PHC. Addressing lifestyle issues in PHC is a task that could be facilitated by modern technology, but little is known about how such methods can best be implemented, and how to achieve a change in practice.

This thesis contributes to knowledge on factors that influence implementation, and to the understanding of how theory can be applied in the implementation of new tools or methods in Swedish PHC. The author of the thesis is a physical therapist with many years experience from Swedish PHC and with a Masters' degree in Public Health, working in the Lifestyle Intervention Research (LIR) Group at Linköping University, Sweden.

BACKGROUND

The background for this thesis provides an overview of implementation research, its various traditions, and models and frameworks described by researchers in the field. It also provides a description of Swedish PHC, the setting in which the study was performed, mainly focusing on the problem of how to address lifestyle issues.

Overview of implementation research

Research regarding implementation in health care services is an expanding field, and knowledge about the factors that influence the spread and adoption of new methods and research findings is growing. When Grol and Jones wrote their article "Twenty years of implementation research" in 2000, they stated that at that point there was some insight into the determinants of uptake of new evidence in health care settings (Grol & Jones 2000). However, they saw that many uncertainties about the most appropriate research methodology and implementation strategies remained (Grol & Jones 2000). Almost ten years later, when Bhattacharyya et al. summarized research regarding implementation, they concluded that "many of the fundamental questions regarding what approaches should be used in which settings for which problems remain unanswered" (Bhattacharyya et al. 2009, p. 491).

Research traditions

Over time, a number of traditions have developed in implementation research. The earliest field was *diffusion of innovations*, followed by *knowledge utilization*, and, after the introduction of the evidence-based medicine movement, fields such as *implementation science*, *knowledge translation* and *translational medicine* emerged. There are no strict boundaries between the traditions, and researchers from different fields are cooperating to make further advances.

In a book entitled Diffusion of innovations, published in 1962, Everett M Rogers for the first time presented his theories about the subject (Rogers 1962). Rogers was a sociologist in the United States whose doctoral dissertation in

1957 was an analysis of the diffusion of agricultural innovations in a rural community. Based on his studies, he suggested a general diffusion model and also argued for conceptualizing the diffusion process, theories that were applied in a wide range of settings in his later works.

Diffusion, according to Rogers, is "the process in which an innovation is communicated through certain channels over time among the members of a social system" (Rogers 2003, p. 5). The four main elements are: the innovation, the communication channels, time and the social system. Regarding the innovation, Rogers mentions a number of perceived innovation attributes that facilitate or hinder adoption: relative advantage, compatibility, complexity, trialability and observability. In the later editions of his book, the possibility of reinvention is another attribute that has been added to the list. Rogers also focuses on the potential adopters and has classified adopters as innovators, early adopters, early majority, late majority and laggards. Each of these groups can be characterized in a certain way. The categorization is not meant to be used to plan an implementation, but could be a part of the explanation as to why innovations spread or not in a certain social system. Another of Rogers' contributions to implementation research is the innovation-decision process, a stage theory explaining how an individual passes from receiving knowledge about the innovation to the final decision to adopt or reject. Research regarding implementation in health care settings has, to a high degree, been influenced by the theories first presented by Rogers. A co-citation analysis of the implementation literature in this area from 1945 to 2005 found that researchers from different fields all refer to Rogers in their work (Estabrooks et al. 2008).

In the second half of the 20th century, knowledge utilization appeared as a research tradition. Havelock, one of the major contributors to the field, built on Rogers' ideas and improved the understanding of dissemination and knowledge utilization in various fields, such as medicine, teaching and social sciences. In a review of the literature available at that time, he concluded that dissemination and utilization of knowledge requires a series of two-way interaction processes that connect user systems with various resource systems, including basic and applied research. Havelock also mentioned the importance of mutual trust between users and resource systems (Havelock 1971).

Another researcher expanding the knowledge utilization field was Weiss, who articulated the concept of research utilization (Weiss 1979). Weiss presents a typology where research is defined according to seven models: *knowledge-driven*, *problem-solving*, *interactive*, *political*, *tactical*, *enlightenment* or as a part of the *intellectual enterprise* of society. The typology is derived from policy research, but is also applicable to research use in practice contexts (Weiss 1979).

Knowledge utilization has continued to be an important field of research, sometimes under the name of knowledge translation (KT). The Canadian Institutes of Health Research (CIHR) defines KT as "a dynamic and iterative process that includes the synthesis, dissemination, exchange and ethically sound application of knowledge to improve health, provide more effective health services and products and strengthen the healthcare system" (Straus et al. 2009, p. 4). Canadian researchers often use the concept of KT in their work. KT researchers seek to close the gap between evidence and practice across decision makers including patients, health care professionals and policy makers (Straus et al. 2009). Graham, a prominent KT researcher, is one of the inventors of the knowledge-to-action model described later in this chapter.

In the early 1990s, the concept of evidence-based medicine began to spread worldwide. The evidence-based medicine movement has its origin at the McMaster Medical School in Ontario, Canada. However, already in 1972, the Scottish physician Cochrane argued that medical care should be based on results from rigorous research (Cochrane 1972). In 1992, an article written by the Evidence-Based Medicine Working Group (1992) was published in JAMA. The group consisted mostly of researchers affiliated to McMaster University and presented a new approach to teaching the practice of medicine. The authors claimed that evidence-based medicine is a new paradigm in medical practice. They believed that clinical experience and clinical instincts are crucial and necessary, but that physicians basing their practice on an understanding of underlying evidence will be able to provide superior care. Sacket et al. (1996) define the practice of evidence-based medicine as "integrating individual clinical expertise with the best available external clinical evidence from systematic research" (p. 71). At that time, there was a substantial gap between research and practice; much of the research was poor quality, there was information overload and a great part of practice was not evidence-based (Trinder 2000). All these factors resulted in a need for the evidence-based medicine movement (Trinder 2000). The Cochrane Collaboration, established

in 1993, is an international network dedicated to updating and promoting the accessibility of reviews published online (Cochrane 2011). The emergence of the Cochrane Collaboration was one of the factors that contributed to the spread of evidence-based medicine (Trinder 2000). Today, evidence-based practices are recommended in various fields, such as education, social work and policy making (Trinder & Reynolds 2000, Hammersley 2007, Otto et al. 2009). However, new evidence-based knowledge will not be of benefit to patients unless it is successfully implemented.

Following on from the evidence-based medicine movement, there was increased interest in studies on how to spread new knowledge and stimulate its uptake into practice; implementation science is now a developing field. The definition of implementation science used in the field is "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services" (Eccles & Mittman 2006, p. 1). Essential issues within the field are organizational behaviour change, clinical guideline implementation and evidence-based medicine. Behaviour change among practitioners is one of the key themes, and theories related to this are perceived as useful in planning and in evaluation of implementation processes (Grol et al. 2005).

Models and frameworks for implementation

Originating from the different research traditions mentioned above, a number of models and frameworks for implementation have been developed. There is a lack of consistency in the literature about the way the terms model and framework are used. The terms conceptual model and conceptual framework, however, can be used synonymously, and refer to "a set of abstract and general concepts and propositions that integrate those concepts into a meaningful configuration" (Fawcett 1999, p. 2). Some of the most widely used models and frameworks are presented here, and whether they are called models or frameworks depends on how their original developers named them. The models/frameworks described have inspired the synthesized model presented in the chapter on Theoretical Framework. Table 1 provides an overview of the models and frameworks described in the text.

Table 1. Implementation models and frameworks frequently applied in health care settings

MODEL/FRAMEWORK	MODEL TYPE	DESCRIPTION	DEVELOPERS /SOURCE
Diffusion of innovation theory	Conceptual model (theory)	Diffusion of innovations is the process by which an innovation is communicated through certain channels over time among the members of a social system	Rogers 1962
The PARIHS framework	Conceptual model	Implementation success (IS) is a function of the nature and type of evidence (E), the qualities of the context (C), and the way the process is facilitated (F)	Rycroft-Malone et al. 2002
A conceptual model presented by Greenhalgh et al	Conceptual model	The factors influencing diffusion are: the innovation itself, system antecedents and readiness, the adopters, the implementation process and the outer context. Linkages between these factors also have to be considered	Greenhalgh et al. 2005
The NIRN conceptual framework for implementation	Conceptual model	Five essential components: a source, a destination, a communication link, a feedback mechanism and the sphere of influence in which the process takes place	Fixsen et al. 2005
A model for effective implementation of change presented by Grol and Wensing	Action model	Formulate a concrete proposal for change, analyze the target group and the setting, develop or select strategies for change, develop and execute an implementation plan, evaluate and, if necessary, revise the plan	Grol & Wensing 2005
The knowledge-to- action framework (KTA)	Action model	The model describes both knowledge creation and knowledge application (the action cycle)	Graham et al. 2006

As already mentioned, Rogers was one of the first researchers to conceptualize implementation when he developed his diffusion of innovation theory. This theory could be considered a conceptual framework, which is why it has been included in this section.

The Promoting Action on Research Implementation in Health Services (PARIHS) framework was presented in 1998 and is still being developed (Rycroft-Malone et al. 2002, Kitson et al. 2008). The framework suggests that *implementation success* is a function of the nature and type of *evidence*, the qualities of the *context*, and the way the process is *facilitated* (Kitson et al. 2008). Evidence should be scientifically robust and match professional consensus and patient needs, context should be receptive to change with sympathetic cultures, strong leadership and appropriate monitoring and feedback systems, and there should be appropriate facilitation of change with input from skilled external and internal facilitators (Rycroft-Malone et al. 2002). The PARIHS framework is widely used, for example for evaluation of the implementation of guidelines among hospitals in the southern region of Sweden, where it was

found feasible (Bahtsevani et al. 2008). Critique raised against the PARIHS framework concerns, for example, how the sub-elements interrelate and interact with each other, and how the individual practitioner fits into the framework (Rycroft-Malone 2010).

Based on a review of about 500 sources (books, journals and databases) Greenhalgh et al. (2005) present a conceptual model highlighting a number of factors that have been shown to influence the diffusion of innovations in health care organizations. Factors that should be taken into account in planning and evaluating an implementation intervention are: the *innovation* itself, *system antecedents and readiness*, the *adopters*, the *implementation process* and the *outer context*. *Linkages* between these factors also have to be considered. The model should be seen as a memory aid for considering different aspects of a complex situation and their interactions (Greenhalgh et al. 2005). One example of its use is as a framework for analysis in a study of a program for suicide prevention in Scotland, where the researchers used the model to identify key factors in the diffusion, dissemination and implementation process (Gask et al. 2008). One of the findings, in line with the Greenhalgh model, was the importance of linkages between the different factors identified, which highlights the complexity of implementation processes.

Another conceptual framework for implementation of defined practices and programs is presented by The National Implementation Research Network (NIRN) at University of North Carolina. The framework is based on an extensive literature review and has five essential components: a *source*, a *destination*, a *communication link*, a *feedback mechanism* and the *sphere of influence* in which the process takes place (Fixsen et al. 2005). The generality of the concepts can be highlighted by examples from manufacturing and human services and applies to a wide variety of programs and practices (NIRN 2011).

The models and frameworks described above are all of a conceptual nature, explaining implementation processes; other models have been developed to guide implementation activities. Two of these action models, one presented as a model, the other as a framework, are described below, as examples of how implementation, built on theory, can be executed in practice.

Built on a review of theories and approaches related to the effective implementation of change, Grol and Wensing (2005) present a step-wise implementation model. The authors advocate a systematic approach that

includes the formulation of a *concrete proposal for change* in practice, analysis of the *target group* and the *setting*, development or selection of *strategies for change*, an *implementation plan*, *evaluation* and, if necessary, *revision* of the plan. The authors claim that the model could be used both for a top-down process, in which an implementer wants to plan and conduct change, and for bottom-up processes in which a team or professional group perceives a need for change and want to integrate a new way of working into practice (Grol & Wensing 2005).

The knowledge-to-action cycle (KTA) developed by Graham et al. (2006) builds on the commonalities found in an assessment of planned action theories. The framework describes both knowledge creation and knowledge application. The creation of knowledge is described as consisting of three phases: knowledge inquiry, knowledge synthesis, and knowledge tools and/or product creation. At the end of the knowledge creation process, the best quality knowledge is synthesized and distilled into a decision-making tool, such as practice guidelines or algorithms (Straus et al. 2009). The action cycle consists of seven phases that can occur sequentially or simultaneously, influenced by the knowledge phases. These phases are: identify problem and select knowledge, adapt knowledge to local context, assess barriers to knowledge use, select, tailor and implement interventions, monitor knowledge use, evaluate outcomes, and sustain knowledge use. The KTA cycle has been adopted by Canada's federal health research funding agency as the accepted model for promoting the application of research and as a framework for the KT process (Straus et al. 2009). A limitation of the framework is that it does not describe in detail what should be done at each phase in the process (Graham & Tetroe 2010), and criticism could also be raised with the argument that there is no linear flow or sequence of phases in innovation spread (Ferlie et al. 2005).

With all these models/frameworks in mind, it becomes clear that there is no ultimate model that explains all the factors potentially influencing implementation. Box, an American statistician and a pioneer in the area of quality control, once stated that "All models are wrong but some are useful" (Box 1979, p. 202). Probably that is true also in implementation research.

The use of theory in implementation research

Theory can be used in research as a tool to organize knowledge and to facilitate the understanding of underlying mechanisms (Punch 1998). Theories can be formal, i.e. explicitly described in the academic literature, or informal, built on experience from practice but not officially recognized (Thompson 2000). There has been a debate among implementation researchers about the importance of using theory. Eccles et al. (2005) argue that as clinical practice is a form of human behaviour, it can be described in terms of general human behavioural theories. The use of theory, on the other hand, is rejected by Oxman et al. (2005), who say that there is no need for theory in implementation research, and Bhattacharyya et al. (2006), who state that there is no evidence that theory-based methods are more successful than implementation strategies built on common sense. There is, however, evidence that behaviour change interventions based on theory are more effective than those not based on theory (van Achterberg et al. 2010), and Estabrooks et al. (2006) claim that theory is important for the success of KT initiatives. The importance of theory is also stressed by Wilson et al. (2010), who provide an overview of conceptual frameworks that can be used to help guide researchers on dissemination planning and activity. The authors also suggest that funders could consider encouraging researchers to use theory for their research dissemination (Wilson et al. 2010). In a systematic review of 235 studies on the use of theory in implementation research, Davies et al. (2010) concluded that less than one-fourth of the studies reported any use of theory, and less than 6% explicitly used theory. Inspired by the discussions described above, the study conducted for the present thesis was designed to compare a theory-based approach to implementation (explicit implementation strategy) to a nontheory-based approach (implicit implementation strategy).

Lifestyle intervention in primary health care

The implementation study performed for this thesis was carried out in Swedish PHC, therefore a brief description of the health care system and how lifestyle issues are addressed in PHC is relevant. Swedish health care is publicly funded and delivered by the county councils. Each county council has the responsibility to provide health care as well as preventive services to the population, and has autonomy regarding health care policy within the context of Swedish law (SFS 1982). Public Health Policy, adopted by the Swedish

government in 2003, provides a list of 11 public health objectives. Number 6 focuses on health-promoting health services (FHI 2011) and states that a more health-promoting and disease-preventative perspective should permeate all health services and be an obvious part of all care and treatment (FHI 2011). PHC has the task of providing care that does not require hospital facilities to those who are affected by chronic or acute illness, but also to provide preventive services to the population (SFS 1982). This gives PHC a vital role in health promotion.

One way to promote health and prevent illness is to address lifestyle behaviours such as alcohol consumption, tobacco use, diet and physical activity, factors that have been shown to have a great impact on health (WHO 2002, Tones & Green 2003, Brønnum-Hansen et al. 2007). By adopting some health-related behaviours and avoiding others individuals can make significant contributions to their own health (Rosal et al. 2004, Pinto et al. 2005, Conner & Norman 2005). There are also studies indicating that measurable improvements in health can be produced by increased public health investments (Mays & Smith 2011).

At the political level there is increasing interest in preventive services, but despite this, many health care systems have a long way to go before health promotion and prevention are provided satisfactorily. A study from Australia found that fewer than 30% of patients at risk of chronic disease routinely received advice about diet or physical activity, and no more than 10% were referred to other health care providers for interventions (Amoroso et al. 2009).

Barriers to providing preventive services in Swedish PHC, identified in a qualitative study, were existing values, structures and resources (Johansson et al. 2010a). The study showed that health professionals in general are positive about and willing to develop a health-promoting and/or preventive role, and they call for organizational changes and more explicit leadership in order to support health promotion (Johansson et al. 2010a). District nurses in Sweden find health promotion an important task, but their experience is that tasks of a medical nature are given priority over health promotion (Wilhelmsson & Lindberg 2009). Other obstacles to health promotion in daily practice are lack of time, knowledge, and skills (Johansson et al. 2002, Stange 2002, Johansson et al. 2005, Casey 2007, Jansink et al. 2010), lack of guidelines and unclear objectives (Johansson et al. 2010b).

In November 2011, a final version of the Swedish national guidelines regarding disease prevention was published (Socialstyrelsen 2011). Four areas of importance for the health of many people are included: *alcohol consumption*, *physical activity, dietary habits* and *tobacco use*. The aim of the disease prevention guidelines is to improve public health, and to make sure that citizens in all parts of Sweden have the same opportunity to get help and support to change lifestyle habits that are potentially harmful. The guidelines strive to present methods with proven effectiveness on behavioural change, so that health care providers can choose and offer methods of benefit for patients at low cost (Socialstyrelsen 2011). The guidelines could be one way to overcome the perceived barriers to providing preventive services in PHC.

A number of tools for health promotion have been tried and evaluated, and are described in the literature. One example is a single checklist reminder form with the aim of improving the delivery of preventive health services in family practice in Canada. Dubey et al. (2006) found this simple low-cost intervention effective in improving the delivery of health services. In a Swedish study, a self-administrative health profile was found to be feasible as a tool for low-budget preventive work in PHC (Blomstrand et al. 2005). Another example is the setting-based PHC activity called Health Square (HS), which has been introduced in Swedish PHC. HS provides health information, computerized testing and individual counselling. Mahmud et al. (2010) studied the implementation of HS, and it was concluded that HS has potential to be a valuable health promotion setting for the population and individuals.

Screening and brief intervention (SBI) are often used in primary care to reduce alcohol consumption levels in a community. When provided by a health care worker, brief intervention (BI) normally takes place within the time-frame of a standard consultation (5–15 minutes) and over one to four sessions. The intervention can include feedback on alcohol use, identification of high-risk situations, increased motivation and the development of an individual plan to reduce drinking (Kaner et al. 2007). The effects of BI have been evaluated and the method has been shown to consistently lead to reduced alcohol consumption (Kaner et al. 2007).

Computer-based interventions

The use of modern technology, such as computer-based solutions, to provide health promotion is an expanding field, and there is a growing body of evidence supporting the effectiveness of computer-based screening and advice, office-based or web-based, for various health-related behaviours (Brug et al. 1999, Kypri et al. 2004, Kypri et al. 2005, Webb et al. 2010). In a number of settings, including emergency departments, primary care, and schools, computerized interventions concerning alcohol or physical activity have been favourably evaluated in terms of feasibility, provider acceptability and patient willingness to participate (Tate et al. 2001, Pinto et al. 2002, Glasgow et al. 2004, Haerens et al. 2007). Compared with conventional face-to-face counselling, computer-assisted health behaviour advice may have several advantages; the use of computers can decrease the effect of social desirability and increase the amount of information disclosed (Tourangeau & Smith 1996, Thomas et al. 1997). Another advantage is that the use of computer-based screening and advice can improve the consistency of counselling and provide a closer match of intervention to patient characteristics and recommended guidelines. When advice is delivered by a computer the number of staff needed to deliver counselling and the associated costs for personnel training can be reduced (Noell & Glasgow 1999).

The computer-based lifestyle intervention tool

The computer-based lifestyle intervention tool (CLT) used in the study conducted for this thesis was developed by the LIR Group at Linköping University in 2004–2005. The concept was based on experiences of SBI regarding alcohol use and physical activity, using a technical aid, in student health care and emergency department settings, as reported by Karlsson & Bendtsen (2005) and Karlsson et al. (2005). The lifestyle assessment provided by the CLT includes questions on age, alcohol consumption, physical activity, referral to the CLT, and attitudes to performing the assessment. The reason for including these two particular lifestyle areas in the first version of the CLT was that they are areas often reported by PHC staff as difficult to address (Graham et al. 2005, Johansson et al. 2005). An extended version of the CLT that will also include tobacco use and dietary habits is planned.

The questions on alcohol consumption are beverage specific and evaluate weekly consumption on a day-to-day basis and frequency of heavy episodic drinking (HED), i.e. intake of a large volume of alcohol on any one occasion. If the respondent reports no alcohol consumption during the last three months, the subsequent alcohol questions are omitted. Alcohol consumption is measured by the number of standard drinks (12 grams of alcohol) per week and the frequency of HED, and is classified into three levels: low risk, increased risk and hazardous consumption. Hazardous consumption is defined for a woman as 10 or more standard drinks per week and/or 4 standard drinks per occasion (HED) once a week or more frequently, and for a man 15 or more standard drinks per week and/or 5 standard drinks per occasion (HED) once a week or more frequently. Those levels are based on recommendations from the Swedish National Institute of Public Health (Andréasson & Allebäck 2005). The intermediate level (increased risk) is defined for a woman as 7-9 standard drinks per week and/or 4 standard drinks per occasion (HED) 1-3 times per month or more frequently, and for a man 10-14 or more standard drinks per week and/or 5 standard drinks per occasion (HED) 1-3 times per month or more frequently. The levels labelled increased risk were constructed by the research team to serve as a wake-up call in the assessment, and are not mentioned by Andréasson and Allebäck (2005).

Physical activity questions are based on recommendations from the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine in 1995 (Pate et al. 1995). The questions measure the number of days per week with moderate-intensity aerobic (endurance) physical activity for a minimum of 30 minutes (renders 1 point/day), and the number of days per week with vigorous-intensity aerobic physical activity (renders 1.7 points/day). Five points are required to be considered physically active. Respondents who reach 3–4 points are considered insufficiently active and those with less than 3 points are considered inactive.

Respondents who complete the assessment receive a printed sheet with information about their risk levels and tailored written advice, based on their answers. Data from the assessment is stored in a computer database (CLT database).

The CLT has been evaluated and found feasible at provider and responder levels (Carlfjord et al. 2009, Carlfjord et al. 2010); both these evaluations were

based on data from the CLT database and from a staff questionnaire. In addition, an evaluation of the effectiveness at the responder level was performed in 2007–2009. Three months after taking part in the assessment, a questionnaire was sent to all responders who agreed to participate in a followup, and the results are presented in Bendtsen et al. (2011) and Leijon et al. (2011). The evaluation showed that, if the cut-off for hazardous consumption for HED was set at once a week or more frequently, more than two-thirds of the individuals who were classified as hazardous drinkers at baseline were non-hazardous drinkers at follow-up after three months. Of those individuals who were physically inactive at baseline, 39% were physically active at followup. When asked if they had read and remembered the tailored advice provided by the CLT, approximately three-quarters of the responders stated that they had read the advice, and that they remembered the information. The results presented above show that performing the CLT did have an impact on lifestyle behaviour. However, these results were not available when the present study was initiated.

Culture and sub-cultures in health care organizations

As the study was conducted in PHC, the existing culture in health care must be taken into account. Some perspectives on culture and sub-cultures in health care are elaborated on in this section.

Organizational culture can be defined as the set of shared values that control organizational members' interactions with each other and with people outside the organization (Jones 2010). The people within the organization, and the organizations ethics and structure are factors that contribute to shaping the culture. Characteristics found to support innovation and creativity in an organization are openness, flexibility and integrative structures (Conway & Steward 2009). Health care, as many other organizations, is characterized by its own culture, and can be categorized by a hierarchical structure and an explicit gender distribution (Larsson 2007).

In large organizations, like for example health care, various sub-cultures exist side by side (Andriopoulos & Dawson 2009). Throughout history, the different professions in health care have struggled to define their identity and role in patient care, and each profession has created their own unique subculture,

including values, beliefs and behaviour (Hall 2005, Wackerhausen 2009). It is also well known that there is a hierarchical structure among the professions, with physicians being the most powerful subculture (Johnson 2009). One explanation for the different sub-cultures can be found in the educational system. Departments of nursing represent a behavioural approach; the medical faculties, in contrast, have traditionally based their education on biological research, and the professions have come to represent different paradigms in health care (Hultberg et al. 1998, Sellman 2010). A more general explanation for the creation of sub-cultures can be found in the social influence theories, claiming that behaviour is predicted by routines observed in others and the social norms of the network (Mittman et al. 1992, West et al. 1999).

There is limited knowledge on whether the existing professional sub-cultures influence the implementation of new practices. Studies that evaluate how professionals respond to efforts to implement new methods in health care have to a large degree focused on physicians, and little is known about other professionals' perceptions of the implementation of new practices (Gravel et al. 2006). Difficulties in interprofessional teamwork, however, have been found to restrict the use of collaborative resources and hinder the desired delivery of patient care and service (Kvarnström 2008).

To summarize, research on implementation in health care is an expanding field, but few studies have been performed in Swedish PHC. There is an obligation in Swedish PHC to address lifestyle issues among patients, and a tool for lifestyle intervention, if successfully implemented, could be a way to facilitate this task. It is unknown what strategies are effective for such an implementation, what role professional sub-cultures might play, and whether theories derived from implementation studies in other settings could be useful.

THEORETICAL FRAMEWORK

This chapter contains a description of the theoretical models used for the planning, performance, evaluation and analysis of the present study. It begins with Rogers' (2003) theory of the innovation-decision process, which was used to create one of the two strategies (explicit strategy) used for the implementation of the CLT. The RE-AIM framework (2011), which was applied to evaluate the implementation, is described; its application in the study is presented in the Methods chapter. A synthesized implementation model, based on the implementation models and frameworks described earlier, was developed for the discussion of the findings of the study, and is presented in this section. Finally, a description of the theoretical aspects of sustainability is also provided.

The innovation-decision process

The theories about diffusion of innovations presented by Rogers include a stage model for adoption, called the innovation-decision process. The stages in Rogers' model are: knowledge, persuasion, decision, implementation and confirmation. The knowledge stage starts when an individual gains an understanding about an innovation and how it functions. Sometimes this is based on a perceived need, but it could also be information provided by a change agent. The next stage, persuasion, is when the individual forms an attitude towards the innovation, positive or negative. The decision stage takes place when the individual actively make a choice to adopt or reject. The implementation stage occurs when an individual puts the innovation to use. Finally, there is a confirmation stage when reinforcement is sought for the decision already made (Rogers 2003). Rogers' stage theory could be compared with the Stages-of-Change theory first presented by Prochaska in 1979 and applied by DiClemente and Prochaska (1982). When the implementation strategies compared in the present study were developed, Rogers' innovationdecision process was the theoretical basis for what was called the explicit implementation strategy.

The RE-AIM framework

The RE-AIM framework was originally developed for the evaluation of public health interventions, and assesses outcome in five dimensions: *Reach, Efficacy, Adoption, Implementation,* and *Maintenance* (Glasgow et al. 1999). These dimensions occur at multiple levels, individual, clinic or organizational, and they also interact to determine the impact of a program or a policy. Both participants and settings can be included in the evaluation, and reach and representativeness are considered important (Glasgow et al. 1999). The Reach and Efficacy dimensions are suggested to be assessed at the individual level, Adoption and Implementation at the organizational level and Maintenance at both individual and organizational levels. Today the framework is presented as a way to enhance the quality, speed, and public health impact of efforts to translate research into practice (RE-AIM 2011). Applied in this field, the term Effectiveness is used rather than Efficacy, and the importance of evaluation at both the individual and organizational level is stressed.

A synthesized implementation model

All the conceptual implementation models and frameworks described earlier have their specific characteristics and advantages and could be used when appropriate, depending on the setting and the objective of the implementation. However, there are also certain similarities, and although terms and concepts differ or are used in different ways, when the models/frameworks were studied for the thesis, four basic elements were identified. These four elements were used to create a synthesized implementation model, illustrated in Figure 1. The model is applied as a framework for the discussion in the thesis.

The four basic implementation elements identified were: the *context*, the *adopters*, the *implementation activities* and the *innovation*. The four elements are dynamic and can change over time; they are not mutually exclusive and are interdependent. The following is a description of the four elements and how they have the potential to influence each other. A brief explanation of how they are described in the original models and frameworks is also provided.

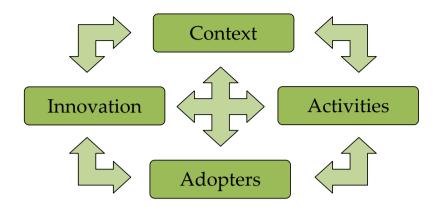


Figure 1. The synthesized implementation model.

The context

The context element can be divided into inner or outer context. Outer context refers, for example, to the environment, current policy or inter-organizational networks, factors that can be critical for implementation. Inner context can be described in terms of organizational structure, organizational culture and leadership. These are all factors that have the potential to influence the implementation process. Structural factors, such as size and complexity, have a positive association with innovativeness (Damanpour 1991, 1992, Nystrom et al. 2002). However, it is probable that it is not size itself that determines innovativeness, but that larger size increases the likelihood of other predictors, such as availability of human and financial resources (Greenhalgh et al. 2005). It can also be hypothesized that structurally complex organizations adopt innovations relatively early, but that less structurally complex organizations diffuse innovations more effectively (Greenhalgh et al. 2005). A supportive organizational culture helps to form a receptive context, and strong leadership and vision have been found to be determinants for openness to change (Greenhalgh et al. 2005).

Another feature of inner context is the ability to learn. Organizational learning can be defined as a change in an organization's knowledge resources (Garvin 1993). A learning organization is skilled at creating, acquiring and transferring knowledge, and uses it to modify behaviour (Garvin 1993). When

organizational routines should be changed, however, this can be achieved only through the learning of individuals (Grol et al. 2005).

In the Greenhalgh conceptual model, inner and outer context is mentioned. Inner context is described in terms of system antecedents and system readiness for innovation (Greenhalgh et al. 2005). In the PARIHS framework, context is one of three key factors for successful implementation, and is divided into the sub-elements culture, leadership and evaluation (Rycroft-Malone 2010). In the NIRN framework, the term influence is used to describe contextual factors influencing the implementation process (Fixsen et al. 2005).

The adopters

The potential adopters are the individuals, the group or the organization that make the decision about whether to make use of a specific innovation. A classification of adopters based on innovativeness has been presented by Rogers (2003). He divided adopters into groups based on how fast they adopted a specific innovation, and then used interviews to define the characteristics of the different groups. Members of the first group, innovators, often belong to networks that take them far away from the local circle of peers. They have the ability to cope with a high degree of uncertainty and are willing to accept a setback. The early adopters are individuals integrated in the social system and respected by peers, often acting as opinion leaders. The early majority is the group that accepts an innovation faster than the average member of a social system, they have good relationships with peers, but are not opinion leaders. The late majority, those who adopt new ideas just after the average member of a system, await the uncertainty about a new idea to be removed before they feel it is safe to adopt. Adoption in this group is sometimes a result of peer pressure or an economic necessity. The last group in a social system to accept an innovation are called laggards. They tend to be suspicious of innovations and of change agents, are conservative and relate mostly to people who share their values (Rogers 2003).

Other important individual factors influencing adoption are motivation, values, goals, particular skills and learning style (Greenhalgh et al. 2005). Cognitive theory of learning states that learning is an active, constructive, cognitive process. Other educational theories focus less on cognitions and more on the motivation to learn. Adults learn better and are more motivated

to change if they start from problems experienced in practice. Based on this, problem-based or self-directed learning can be used efficiently in the implementation of change in health care, and strategies for change should be tailored to the identified needs of the learners (Grol et al. 2005).

In the Greenhalgh conceptual model, the adopter is mentioned as one of the determinants for the spread and sustainability of innovations (Greenhalgh et al. 2005). The NIRN framework (Fixsen et al. 2005) does not use the term adopter, but talks about the destination of a defined practice or a program, a term that could be interpreted in a way similar to the adopter. In the PARIHS framework, the adopter is not mentioned, but the role of the individual in decision making in relation to PARIHS has begun to be explored (Rycroft-Malone et al. 2009).

The implementation activities

A number of strategies to introduce innovations or improve the use of research have been described. The Cochrane Effective Practice and Organisation of Care Group (EPOC) presents a classification that focuses primarily on change in practice (Thorsen & Mäkelä 1999). The taxonomy includes interventions oriented towards health professionals, financial interventions, organizational interventions (which can be structural, staff-oriented or patientoriented), and regulatory interventions. Interventions oriented towards health professionals include, for example, the distribution of educational materials, conferences, feedback and reminders (Thorsen & Mäkelä 1999). Nutley et al. (2007) present five prevalent and important mechanisms for research use dissemination, interaction, social influence, strategies: facilitation incentives/reinforcement. Dissemination means that research findings circulated or presented to potential users, an activity that can raise awareness, but is usually not sufficient to change practice. Interaction, the collaboration between researchers and practitioners, is a costly but more effective strategy. Social influence is a way to rely on influential others, such as colleagues or local opinion leaders, to persuade the potential users of the value of new findings. The critical phase of this strategy is the identification of these key groups of individuals. Facilitation refers to enabling the use of research, and can include educational interventions and staff training. Facilitating activities have been shown to be effective if three or more interventions are combined. Educational interventions of one day or less have little or no effect on

changing practice. Incentives and reinforcement can have a positive influence, but evidence is mixed and limited, and initial success may not persist over time (Nutley et al. 2007).

Greenhalgh et al. (2005) provides a figure illustrating implementation activities as a continuum from "Let it happen" over "Help it happen" and with "Make it happen" as the other end point, from a natural to a managerial process. Implementation efforts initiated from managers tend to be top-down approaches, and a natural spread or diffusion could be categorized as bottom-up. Researchers in the KT area use the concepts push, pull and exchange, where push efforts are those where knowledge producers try to disseminate their findings, pull strategies are used by knowledge users to obtain knowledge from reliable sources, and exchange efforts aim to bring researchers and users together in interactive processes (Gagnon 2009).

In the models/frameworks studied, the implementation activities are described in various ways. NIRN (Fixsen et al. 2005) depicts a communication link transferring a practice or a program to its destination, and the PARIHS framework focuses on the facilitation of the process (Rycroft-Malone 2010). Facilitation in the PARIHS framework refers to enabling the implementation process by an individual, the facilitator (Rycroft-Malone 2010). The KTA framework describes the implementation activities as an action circle including selected and tailored interventions (Graham et al. 2006), and Grol and Wensing. (2005) present a step-by-step model for the activities. In the Greenhalgh model, communication and influence are mentioned in terms of diffusion or dissemination, and the implementation process also includes decision making, resources, training, collaboration and feedback (Greenhalgh et al. 2005).

The innovation

In the synthesized model, the innovation is the object that is to be implemented. Innovations can be technological or administrative, as defined by Westphal et al. (1997). Technological innovations are often easy to define. Administrative innovations, however, can include many different routines that can be combined in various ways. What defines an innovation is that it is perceived as new by the adopters, even if it has been in use in other settings for a shorter or a longer period. Attributes influencing the rate of adoption of

an innovation suggested by Rogers (2003) are: relative advantage, compatibility, complexity, trialability, observability and reinvention. Relative advantage can be described as the extent to which the innovation is perceived as being better than the current practice, compatibility is the degree to which an innovation is being consistent with existing values and needs of the adopters, and complexity is the degree to which an innovation is perceived as difficult to understand and use. Trialability is the degree to which an innovation can be experimented with on a limited basis, observability is the degree to which the results of an innovation are visible, and reinvention is the degree to which an innovation can be changed or modified in the process of adoption and implementation (Rogers 2003).

The presence of a sound evidence base for the innovation is another critical factor. In the PARIHS framework, the term innovation is not mentioned, but one of the key factors suggested to influence implementation success is evidence (Kitson et al. 2008). Evidence is also highlighted in the KTA framework, where knowledge creation precedes the action cycle (Graham et al. 2006). Greenhalgh et al. (2005) use the concept innovation, and NIRN (Fixsen et al. 2005) define a new practice or a new program to be implemented as a source.

Interdependency between the factors

As already mentioned, the four basic elements of the synthesized model are interdependent. Adopters, in terms of staff members, influence the culture at their working place to a high degree and thus influence context. Context can also be influenced by the innovation itself, as a new way of working might change climate and hierarchies, and by the implementation activities, for example education and training.

Adopters, on the other hand, are influenced by the context in which they are working, they can be influenced by the innovation if the innovation has this potential, and implementation activities are designed to influence adopters, for example, by educational interventions or incentives.

The implementation activities are not directly influenced by the other elements, but are often chosen to fit the actual context and the potential

adopters, as well as the innovation. In that sense, all these factors might influence the implementation activities.

If an innovation is to be influenced by the other elements, this requires a possibility for reinvention. An innovation that cannot be changed (e.g. the way to use a new drug) may not be influenced by the other factors. If, however, an innovation allows reinvention, adopters can choose how to use it under their specific circumstances. The innovation can be changed to better fit the context in which to use it, and the implementation activities can aim to introduce the part or parts that best fit the receiving organization. Implementation activities can also promote the implementation of a specific innovation that is thought to fit the local context.

Outcome is not a part of the model, because the model was intended to explore factors influencing outcome. However, it is also possible that outcome has the potential to influence the elements of the model in a circular process.

Sustainability

When an innovation or a new practice is implemented in health care, there is an underlying assumption that its use will be maintained over time. There are, however, a number of barriers to sustainability, and Mendel et al. (2008) claims that one of the most central issues in addressing the gap between knowledge and practice is the sustainability of new innovations. One problem is the tension between routinization of one idea and the receptivity of a subsequent new idea, implicating the need for adaptation, processes that allow for integration of new insights, and flexibility to changes in models of care delivery (Davies & Edwards 2009).

In a qualitative study to identify factors related to sustainability of health promotion interventions, O'Loughlin et al. (1998) found that *low-cost or no-cost, modification of interventions* during implementation, a *good intervention-provider fit,* and the *presence of a program champion* (i.e. a person who advocates continuation of the intervention) were variables independently associated with perceived sustainability. Parrish et al. (2009) studied factors that promoted sustainability of an intervention in hospital settings, and their findings were similar to those in the O'Loughlin study, with the addition of *leadership support* as another key factor. In a Swedish study, sustainability of a

child health promotion program was evaluated two years after the implementation (Edvardsson et al. 2011). Factors positively related to sustainability were involvement in developing the program, small-scale testing, personal values corresponding to programme intentions, and managerial support (Edvardsson et al. 2011).

Davies and Edwards (2009) describe eight important factors to consider in the development of a sustainability action plan: the *relevance of the topic*, the *benefits, attitudes, networks, leadership, policy articulation and integration, financial factors* and *political factors*. These are factors influencing the receptivity to new knowledge, and the capacity to interpret and apply it. The authors advocate planning for sustainability as early as possible in the implementation process, and recommend the use of models for sustainability and for adaptation.

A sustainability model and guide developed by the Institute for Innovation and Improvement at the National Health Service in the United Kingdom (NHS 2010) describes ten factors that have been found to play a crucial role in sustaining change in health care. The factors are divided into the groups: *staff level, organization level* and *process level*. The factors identified are: at the staff level, *training and involvement, attitudes, senior leaders* and *clinical leaders*; at the organization level, *infrastructure* and *fit with goals and culture*; at the process level, the *monitoring process, adaptability, credibility of evidence,* and *benefits beyond helping patients*. There are many similarities between this sustainability model and the implementation models mentioned earlier, showing that achieving sustainability is an essential factor in implementation.

Apart from sustainability, there are a number of other terms for the phenomenon of an innovation being embedded or integrated into routine practice, for example; maintenance, institutionalization, continuation, long-term viability and longevity. In the present study the terms maintenance and sustainability are used.

The theoretical framework presented in this chapter, consisting of the *innovation-decision process*, *RE-AIM*, the *synthesized implementation model* and theories regarding *sustainability*, plays an essential role in the thesis. The challenge of implementing research findings into practice, and the facilitation of lifestyle intervention in PHC, as described in the Background chapter, together with the theoretical framework form the foundation for the thesis.

AIMS

General aim

The general aim of the thesis was to apply theory in the study of the implementation of an innovation in Swedish PHC, and identify factors that influenced outcome.

Specific aims

- To describe contextual factors and evaluate whether organizational climate and implementation strategy influenced outcome at the introduction of a computer-based tool for lifestyle intervention in PHC (Paper I).
- To evaluate two implementation strategies for the introduction of a new tool for lifestyle intervention in PHC, applying the RE-AIM framework to assess outcome in terms of reach, effectiveness, adoption, and implementation (Paper II).
- To apply implementation theory to identify key factors influencing the adoption of an innovation being introduced in PHC in Sweden (Paper III).
- To explore how professional groups and managers experienced the implementation of a new tool for lifestyle intervention in PHC (Paper IV).
- To evaluate the implementation of a new tool for lifestyle intervention in PHC two years after the introduction, and assess if the implementation strategy used influenced sustainability (Paper V).

METHODS

Setting

The study was conducted in PHC in southeast Sweden, in an area with approximately one million inhabitants, including three county councils (Östergötland, Jönköping and Kalmar). When the study was initiated, there were 124 PHC units (i.e. health care centres with general practitioners (GPs) and other health professionals) operating in the area. Most of the PHC units are public but there are also private providers who have contracts with each county council. An invitation was directed to the public health administration of the three county councils, and six PHC units, two from each of the county councils, who volunteered to participate, were included in the study. Units were chosen to be as similar as possible within each county council, regarding size (number of listed patients), catchment area (rural or urban) and age distribution among patients. Unit characteristics are presented in Table 2.

Table 2. Baseline data on the number of employees at each unit, and the number and age distribution among patients listed at each unit

	County council A		County of	council B	County council C	
	Unit Al	Unit All	Unit BI	Unit BII	Unit CI	Unit CII
Employed (n)	45	39	28	31	14	36
GPs (n)	8	7	5	6	4	5
Listed patients (n) Age (%)	13667	12963	10182	9775	6031	7329
<u>≤</u> 19	24	28	20	20	23	20
20-64	57	56	55	58	57	57
65–74	9	9	11	11	10	8
>74	9	7	13	11	10	14

GP, general practitioner.

Design

The study was performed as an intervention with a non-equivalent comparison group post-test design, and could be defined as quasi-experimental (Polit & Beck 2012). Both quantitative and qualitative methods were applied. A baseline questionnaire was distributed to staff and managers at the participating units, and a tool for lifestyle intervention, the CLT, was

then introduced using two different strategies. One unit from each county council was randomly assigned to one of the two strategies and the other unit from that county council was assigned to the other strategy. Data from the lifestyle assessment provided by the CLT was stored in the CLT database. After six months in operation, data from the CLT database and data from county council registers were collected to assess the proportion of patients who had been referred to the CLT. When the CLT had been in operation for nine months, staff and manager follow-up was performed. In operation should be interpreted as the time the computers were functioning; at two units, this time was extended to compensate for periods of malfunction or holiday closing. At the nine-month follow-up, a questionnaire was sent to the staff at all participating units, individual interviews were performed with managers, and focus group interviews were performed with the staff. After another 15 months, i.e. after 24 months in operation, another follow-up was performed, including a questionnaire to staff. Paper I is based on the baseline assessment and register data after six months, Papers II-IV are based on the nine-month follow-up and Paper V is based on the 24-month follow-up questionnaire and register data. Table 3 provides an overview, showing in detail the methods used in the five papers. An overview of the study, showing a timeline, the interventions and the measure points is provided in Figure 2.

Table 3. Overview of methods used in the study

PAPER	RESEARCH METHODOLOGY	DATA SOURCES	VARIABLES ASSESSED	METHODS FOR ANALYSIS
I	Quantitative	Questionnaire (Appendix A) Data from computer database	Creative Climate Questionnaire	Statistical analysis;
		and county council registers	Strategy Proportion of referred	Student <i>t</i> test, risk ratio
II	Quantitative	Questionnaire (Appendix B) Data from computer database and county council registers	Strategy Reach, Effectiveness, Adoption, Implementation	Statistical analysis; risk ratio, non-parametric tests
III	Quantitative and qualitative	Staff interview data Data from computer database and county council registers	Strategy Proportion of referred Staff perceptions of the implementation	Statistical analysis Directed content analysis
IV	Qualitative	Interview data, staff and managers	Perceptions of the implementation according to professional group	Manifest content analysis
V	Quantitative	Questionnaire (Appendix C) Data from computer database and county council registers	Strategy Reach, Effectiveness, Adoption, Implementation, Maintenance	Statistical analysis; risk ratio, non-parametric tests

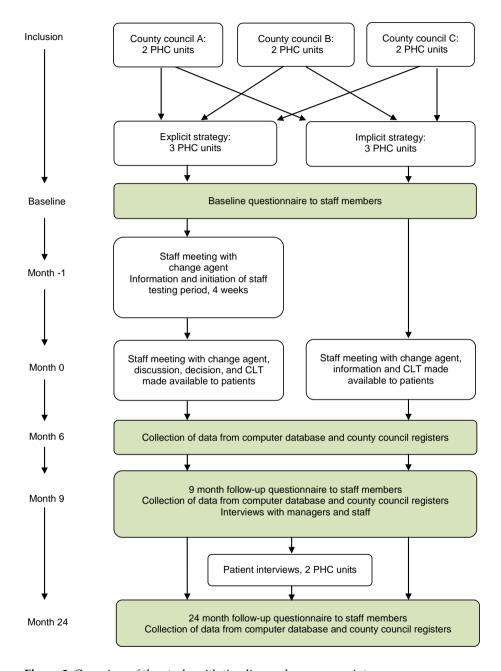


Figure 2. Overview of the study with timeline and measure points.

Implementation strategies

For the implementation of the CLT, two different strategies were used. If categorized according to the mechanisms described by Nutley et al. (2007), both strategies could be defined as facilitation of the implementation process, however, the explicit strategy was based on implementation theory, and included more education and staff training than the implicit strategy. Using the Greenhalgh et al. (2005) terminology, implicit strategy can be described as a way to "help it happen" and the explicit strategy was closer to "making it happen". The two strategies are described in detail below:

- The implicit implementation strategy included one visit to the unit by the author of the thesis acting as a change agent from the research team, who demonstrated the CLT, and gave staff members instructions about the opportunity to refer their patients to the CLT after the consultation. The CLT was installed and was made available to patients, and a staff member was assigned as a liaison with the research team. The decision to receive the CLT was made by the manager, using a top-down approach.
- The explicit implementation strategy was based on Rogers' theories about the innovation-decision process, including knowledge, persuasion, decision and implementation (Rogers 2003). Attributes of the innovation, such as trialability and observability were also taken into account (Rogers 2003). This resulted in a strategy that began with an information session. The author of the thesis, acting as a change agent from the research team, visited the unit to provide knowledge about the CLT to all staff members. The information session was followed by a trial for one month, during which all staff members were encouraged to perform the lifestyle assessment provided by the CLT and give their opinions about it. The trial was part of the persuasion stage in Rogers' model but also made staff aware of the trialability and observability of the CLT. After the one-month trial, the change agent visited the unit again. There was a discussion about how the CLT could be used in the daily work, and a mutual agreement to incorporate it or not, as a working method, was made. The purpose of this was to facilitate the decision stage.

After that second meeting the CLT was made available to patients, in accordance with the implementation stage, and a staff member was assigned to be a liaison with the researcher.

From the time the CLT was made available to patients, feedback compiled by the research team was sent by e-mail to the manager and to the liaison at each unit, weekly for the first six months and monthly thereafter. The feedback included the number of completed assessments, distribution of those assessed into different risk groups concerning alcohol and physical activity, and the proportion of patients referred by each staff category. The feedback was provided in order to encourage sustainability, and did not differ between strategies. Both strategies can be described as low-cost strategies.

Application of the RE-AIM framework

The RE-AIM framework used in Papers II and V, when used to translate research into practice, assesses outcome in five dimensions: *Reach, Effectiveness, Adoption, Implementation,* and *Maintenance* (Glasgow et al. 1999, RE-AIM 2011). It is suggested that the dimensions Reach and Efficacy are assessed at the individual level, Adoption and Implementation at the organizational level and Maintenance at both the individual and organizational level (RE-AIM 2011). For the present study, the framework was modified to suite the research questions. Only staff perspectives were assessed, and outcome at the patient level was not included in the study. The dimensions assessed at the individual (staff) level were Reach, Effectiveness, and Implementation. Adoption and Maintenance were assessed exclusively at the organizational level. The original definitions of the RE-AIM framework (Glasgow et al. 1999, RE-AIM 2011), a description of how the dimensions can be applied in PHC, the application in the present study and the outcome variables are presented in Table 4.

Table 4. The RE-AIM framework and its application in the study

DIMENSION	ORIGINAL RE-AIM DEFINITION	APPLICATION ON IMPLEMENTATION OF INNOVATIONS IN PHC	DEFINITION IN THE PRESENT STUDY	OUTCOME VARIABLE
Reach	The absolute number, proportion, and representativeness of individuals who are willing to participate in a given initiative	The absolute number, proportion and representativeness of staff members who have participated, i.e. used the innovation in practice	Proportion of staff members who reported having referred patients to the CLT	Proportion of staff members referring patients to the CLT, and frequency of referral
Efficacy/ Effectiveness	The effect of an intervention on important outcomes, including potential negative effects, quality of life, and economic outcomes	The effect of the introduction of the innovation on staff members' attitudes and performance	The impact of the introduction of the CLT on staff members' attitudes and performance regarding lifestyle issues at the PHC unit	Frequency of discussing lifestyle with patients now versus before, perceptions about referring to the CLT, reliance on effects of the assessment, agreeing with advice provided, perceptions of importance of lifestyle issues at the unit, acceptance among the staff group
Adoption	The absolute number, proportion, and representativeness of settings and intervention agents who are willing to initiate a program	The extent to which the innovation has been accepted at unit level	The extent to which the CLT has been used at unit level, measured by the proportion of eligible patients who perform the assessment / were referred to the CLT	Proportion of eligible patients performing the assessment and stating they were referred to the CLT
Implementation	At the setting level, implementation refers to the intervention agents' fidelity to the various elements of an intervention's protocol	Fidelity to the original ideas linked to the innovation – is it used as intended?	Fidelity to the original ideas linked to the CLT – are patients being referred, is the result discussed with patients, is the CLT discussed among staff members?	CLT discussed by staff group, assessment results discussed with patients, proportion of patients referred and reasons for not referring, involvement in the implementation process
Maintenance	The extent to which a program or policy becomes institutionalized or part of the routine	The extent to which the innovation has been institutionalized and is still in use after a specified time period	The extent to which the CLT has been and is still used after 24 months of operation	Proportion of eligible patients performing the lifestyle assessment and reporting referral to the CLT at 3, 6, 9, 12, 15, 18, 21 and 24 months

Data collection

Survey questionnaires

Three questionnaires were used in the study (Papers I, II and V). The first questionnaire (Appendix A), used at baseline, contained background questions, some questions about addressing lifestyle issues and the Creative Climate Questionnaire (CCQ) (Ekvall 1996) described in this chapter.

The second questionnaire (Appendix B) was used for the nine-month follow-up and included questions designed to detect how the CLT had been adopted at the unit. The questionnaire was developed for the present study and the questions were thoroughly examined and discussed by a group of experts in the research team until consensus was reached. The questionnaire was tried by staff at a PHC unit with experience of the CLT, not participating in the study, and their comments were taken into account for the final version. Apart from background factors such as gender, profession, and number of years in profession, the questionnaire included seven statements about the CLT answered on a 4-degree Likert-type scale with the response alternatives agree, partly agree, partly disagree, disagree. The questionnaire also included questions concerning referral to the CLT and opinions about lifestyle issues. Questions were formulated with the aim of covering and evaluating the three RE-AIM dimensions: Reach, Effectiveness, and Implementation.

For the 24-month follow-up, a few new questions were added to the questionnaire used after nine months, resulting in the third questionnaire (Appendix C). The new questions (nos. 16–18, 21–22) all concerned the dimension Implementation, on whether the CLT facilitates addressing lifestyle issues, and how it has been incorporated into the work routine. One question regarding involvement in the introduction of the CLT was omitted. Study participants were regarded as a closed cohort, so that only staff members working at the unit from the beginning of the study period were selected for follow-up assessment. This resulted in a declining number of questionnaires distributed from baseline to 24 months. Response rates were high for the baseline questionnaire, but decreased over time. The number of questionnaires distributed and the response rates for the three survey questionnaires are presented in Table 5.

Table 5. Response rates for the three questionnaires used in the study

Questionnaire	Group	Distributed	Responses	Response rate (%)
Baseline	County A	81	66	81
	County B	48	40	83
	County C	45	38	84
	Total	174	144	83
9 months	Explicit strategy	77	52	68
	Implicit strategy	82	64	78
	Total	159	116	73
24 months	Explicit strategy	62	36	58
	Implicit strategy	55	37	67
	Total	117	73	62

The CCQ

The CCQ, used for the baseline assessment (Paper I), developed by Ekvall (1996) to measure the creative climate within working organizations, was used with permission from the owner. The instrument has been tested for validity and reliability and applied in various organizational settings. It has been used to assess work climate in health care organizations in several studies conducted in Sweden (Ekvall 1990, Norbergh et al. 2002, Boström et al. 2007, Fransson-Sellgren et al. 2008), in other types of organizations, such as air transport (Arvidsson et al. 2006), and in other countries (Mohamed & Richards 1996, Zain et al. 2002, Bach Jensen & Beckman 2007, Zhou et al. 2010).

The instrument consists of 50 statements answered on a 4-point scale: 0, not at all applicable; 1, applicable to some extent; 2, fairly applicable; 3, applicable to a high degree. The statements are formulated in the following way: "People here take the time to discuss new ideas" (Appendix A). The statements are grouped into ten different organizational climate dimensions with five statements covering each dimension. The ten dimensions are:

- 1. Challenge: the employee's involvement in and commitment to the organization.
- 2. Freedom: the extent to which employees are allowed to act independently in the organization.
- 3. Idea support: the overall attitude towards new ideas.
- 4. Trust/openness: the emotional security and trust in the relations within the organizations.

- 5. Dynamism/liveliness: the dynamics within the organization.
- 6. Playfulness/humour: the spontaneity and ease that is displayed in the organization.
- 7. Debate: to what extent different views, ideas and experiences exist in the organization.
- 8. Conflicts: the presence of personal and emotional tensions.
- 9. Risk taking: the willingness to tolerate insecurity in the organization, such as new ideas, news and initiatives rather than the conventional definitions of risk taking.
- 10. Idea time: the time devoted to development of new ideas.

Despite the use of an ordinal scale, the instrument allows mean values (scores) to be calculated for each dimension, and differences between organizations can be calculated using the Student t test. The higher score the more creative the climate except for the Conflicts dimension, where the reverse applies. The CCQ instrument also provides reference values to describe an organization as innovative or stagnated (Ekvall 1990). The reference values are based on studies of ten innovative and five stagnated organizations (Ekvall 1990).

Register data and outcome variables

Patients eligible for the CLT were individuals aged ≥18 years who attended the PHC unit in a predetermined time period. Data regarding the number of eligible patients who performed the lifestyle assessment and the number of patients who also reported referral to the CLT were obtained from the CLT database. Data regarding the number of individual patients attending the unit during different times during the study period were obtained from county council registers.

The independent variable used in the study was the implementation strategy used for the introduction of the CLT, i.e. the explicit or implicit strategy. The variable Creative Climate used in Paper I, is a baseline condition, like, for example, the size of the unit or county council, and was used as an independent variable interacting with implementation strategy.

In this study, the term outcome is consequently used as the measurement of implementation success at staff level, since effects at the patient level were not part of the data collection. To measure outcome, a number of dependent

variables were chosen. The purpose of the intervention was staff referral to the CLT. The main outcome variable was thus the proportion of eligible patients who had been referred to the CLT. However, performing the assessment without referral (i.e. spontaneously) was also allowed, and another outcome variable was the proportion of eligible patients who performed the lifestyle assessment. In Papers II and V, the RE-AIM dimensions. *Reach, Effectiveness, Adoption, Implementation* and *Maintenance* (only Paper V) were used as dependent variables. In Paper III, a study using both qualitative and quantitative data, staff perceptions at the units were compared with implementation outcome in terms of proportion of referrals.

Data obtained from the CLT database only captured patients who actually performed the lifestyle assessment, which means that patients who were referred by a staff member but chose not to perform the assessment were not registered. This is a weakness, which is discussed in the Methodological Discussion. To solve this problem, and evaluate the reliability of using patient-reported referral as an outcome variable, a telephone interview was performed with patients at the two largest participating units (one used the explicit strategy and the other used the implicit strategy). All patients eligible for the assessment who visited the unit on two particular dates were called within one week of the visit, and were asked if they had been referred to the CLT, and if they had performed the assessment. The aim was to assess to what extent patients who are referred to the CLT actually perform the assessment.

One hundred fifty-four adult patients attended the explicit unit on the two days assessed. Of these, 32 could not be reached or refused to take part in the interview. Of the remaining 122 responders, no one stated they had been referred to the CLT at the visit, however 17 had performed the assessment at a former visit, and 12 could not remember whether they had performed the assessment before or not.

One hundred eighty-nine adult patients attended the implicit unit during the two days. Eight could not be reached and 181 took part in the interview. Four patients stated they had been referred to the CLT, but no one had performed the assessment. Referrals were made by nurses (3) and by the counsellor (1). None of the patients had performed the assessment at a former visit to the PHC unit.

According to the CLT database no assessments were performed at either of the two units during the two days studied, however, in the same month, 19 assessments were performed at the explicit unit and five at the implicit unit. The fact that, unfortunately, no patients performed the assessment during the two days studied made it impossible to evaluate whether the low number of assessments performed was due to low levels of referral or low patient compliance. The results from the patient interview have not been published to date.

Interviews

One aim of the study was to assess how managers and staff experienced the implementation process at the introduction of the CLT. To gain deeper insight into this issue, and to assess perceptions within the different professional groups, a qualitative method was chosen for Papers III and IV. The use of focus group interviewing, a research methodology that allows the study of how views are constructed and expressed in a discussion context (Wibeck et al. 2007), was chosen for staff interviews; individual interviews were chosen for managers.

When the CLT had been in operation for nine months, an invitation was sent to managers and staff at the participating units. Managers were invited to an individual interview, and all six managers agreed to participate. Among the managers, three different professions were represented: one physician, four nurses and one physiotherapist. Individual interviews with managers were performed between January and June 2009, lasting between 18 and 28 minutes (average 22 minutes) and were conducted by the author of this thesis.

All staff members who could be expected to have had the opportunity to refer patients to the CLT (159 individuals) were invited to participate in a focus group interview. Those who signed up and attended the interview session at each unit were included, forming a convenience sample (Polit & Beck 2012). To provide good incentives for interaction (Wibeck et al. 2007), small groups with a common ground were desired, and the informants were grouped according to profession. GPs formed one group, nurses another group and allied professions together with nurse assistants formed a third group at each unit. The number of participants from each staff group at each unit is

presented in Table 6. One of the nurses and 12 of the GPs were men; all other participants were women.

Table 6. F	'articipants i	n the focu	s groups and	d individua	l staff interviews
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Profession	-			Unit			
	1	II	III	IV	V	VI	Total
GP	3	4	3	7	5	3	25
Nurse	5	5	2	4	4	7	27
Nurse assistant	4	2	1	2	1	1	11
Allied professional	0	0	0	2	0	2	4

Focus group interviews lasted between 35 and 50 minutes (average 37 minutes) and were moderated by the author of the thesis. An assistant observed the interview session and took notes. After the interview session, the moderator and the assistant met for a brief talk about their impressions as suggested by Krueger (1998). When only one member of a certain staff group could participate (at units III and VI) individual staff interviews were performed. These lasted 15 and 17 minutes.

An interview guide was prepared in advance, covering the overall working situation coinciding with the implementation process, experiences of the implementation activities and of the CLT, how to address lifestyle issues with patients and openness to innovations at the unit (Appendix D). A similar guide was used for the manager interviews (Appendix E). Interviews were recorded using a digital recorder and were transcribed verbatim. Because only four allied professionals participated in two groups together with nurse assistants, the results for the allied professionals were not included in the analysis in Paper IV.

Data analysis

Quantitative analysis

Analysis of differences between groups according to ordinal data was performed using the Mann-Whitney U test; comparison of means was made using the Student t test, and differences according to categorical non-parametric data were analyzed using the χ^2 test. To compare the proportion of

eligible patients performing the lifestyle assessment (or performing the assessment and stating referral to the CLT), between units, the risk ratio was calculated to show the likelihood of performing the assessment or the likelihood of being referred to the CLT at one unit compared to another (Kirkwood & Sterne 2003). Statistical analyses of quantitative data were performed using the computer-based analysis program, Statistical Package for the Social Sciences (SPSS) version 16.0 and 19.0, and the open access statistical program, OpenEpi version 2.3.1. Statistical significance was set at $P \le 0.05$.

Qualitative analysis

A qualitative content analysis was used in Papers III and IV of this thesis. According to Graneheim and Lundman (2004), qualitative content analysis can focus on manifest or latent content. Manifest content refers to obvious visible content, and latent content involves a deeper interpretation of the underlying meaning of a text. The nature of the qualitative data collected for Papers III and IV, gathered mainly from the focus group interviews and covering experiences of a predetermined subject, made manifest content analysis the most appropriate method.

The unit of analysis chosen was the transcribed text of the entire interviews. Throughout the text, meaning units, i.e. words or sentences containing aspects related to each other through content or context, were identified. The meaning units were condensed to contain only a few words, and were then labelled with codes. This process is described by Graneheim and Lundman (2004). The same unit of analysis and the same coding was used for Paper III and Paper IV, but after that step the analyses were different.

In Paper III, themes were chosen deductively from implementation theory. The analysis of the coded data resulted in a number of categories, and the categories were sorted into the themes. This method, where themes are chosen in advance, and categories are sorted into these predetermined themes using a deductive approach, is called directed content analysis and was described by Hsieh & Shannon (2005). An example of the step-wise analysis process used in Paper III is shown in Table 7.

Table 7. Example of the step-wise process in qualitative content analysis, used in Paper III

Table 7. Example of the ste	p-wise process in	quantative co	ntient analysi	s, used in Paj	er III
MEANING UNIT (MU)	CONDENSED MU	CODE	SUB- CATEGORY	CATEGORY	THEME
If it is a patient where you believe lifestyle is important you talk to them about that, then it is not natural to also refer them to the computer	If you already did address the issue you cannot refer	Difficult to combine with discussions	Not compatible		
Assessment is performed anonymously, so it is, sort of, nothing we can use in clinical practice	Nothing we can use in practice	Not useful	compatible		
Maybe that is why you should refer everyone, not only those with a risky behaviour; everybody could benefit from performing the assessment	Everybody could benefit, and should be referred	Everybody could be referred	Composible	Compatibility	
I think it is mainly an opportunity for assistant nurses and physiotherapists to refer to the computer	Opportunity for nurse assistants and physiotherapists to refer	Opportunity for other staff groups	Compatible		
It generates more work, it generates questions about lifestyle if I mention the CLT	Referral might generate questions from the patient	Generates more work	Danainad		Innovation character-
If the assessment was more complete, including dietary and smoking habits as well as physical activity and alcohol consumption, it would be more useful	Dietary and smoking habits should be included	Assessment is too limited	Perceived dis- advantage		istics
You believe that smoking is the biggest problem, and you find out that alcohol consumption is a huge problem, that is what you can see from these data, and you do not know anything about the patient who comes in with a broken leg	The alcohol problem is bigger than we think; assessment helps us find patients with problems	Can detect excessive alcohol consumption	Perceived advantage	Relative advantage	
If we forget to refer, there are always some patients who perform it anyway; it is not hidden, so if you are curious you can see it, I think that is good	Positive that patients can perform the assessment spontaneously	Performing assessment spontaneous ly is positive	J		
We found that it took only a short time to perform the assessment, so many of the staff members tried it	Many staff members tried the assessment as it was easy	Easy to try		Trialability	

In Paper IV, the coded data were sorted according to the areas assessed. New categories emerged inductively from interview data and were presented according to the profession of the respondents. The depth of the interpretations was consistent with the application of manifest content analysis (Graneheim & Lundman 2004).

Ethics

The main part of the study, the baseline and follow-up questionnaires and the group interviews concerned staff members and managers but no patients. All data material was stored in a database at the university and in the three county council databases, with high levels of security. Interview data were treated confidentially, so that no individuals could be identified in the presentation of the results.

Patients were involved only in the telephone interview, which was performed by a staff member at each unit. No data that could be tracked to individual patients were handed over to the researcher. Patients visiting the units during the month of the telephone interview were informed about the possibility of receiving a call regarding the present study.

All units that participated in the study certified that they had resources to handle questions from patients after performing the lifestyle assessment provided by the CLT.

When data from the questionnaire for the 24-month follow-up was analyzed, it was found that one unit had less than five respondents. Such a low number might make it possible to identify individuals, so this particular unit was excluded from the 24-month evaluation.

The study was approved by the Ethical Board in Linköping, Sweden, (Ö 16-08).

RESULTS

The results are presented according to the factors hypothesized to influence implementation outcome, starting with organizational climate and implementation strategy, then implementation strategy evaluated in terms of RE-AIM, and finally staff perceptions of the implementation process.

Organizational climate and implementation strategy (Paper I)

In Paper I, baseline data in terms of organizational climate, measured by the CCQ, implementation strategy and implementation outcome after six months were evaluated. The two participating units in each county council were compared. The CCQ was completed by 121 individuals. Demographic data of the respondents at baseline is presented in Table 8.

Table 8. Demographic characteristics of the respondents at the units at baseline

Unit		Al <i>n</i> =35	All <i>n</i> =24	BI <i>n</i> =15	BII <i>n</i> =17	CI <i>n</i> =7	CII n=23	Total <i>n</i> =121
Mean age		48	47	50	50	49	48	48
Gender (%)	Females	86	88	87	88	71	87	86
	Males	14	12	13	12	29	13	14
Profession (%)	GPs	20	25	40	23	43	4	22
	Nurses	40	46	33	59	43	52	46
	NAs	20	8	13	18	14	26	17
	APs	20	21	13	0	0	17	15
Years in practice								
(%)	0–2	0	8	13	0	14	4	5
,	3–5	9	4	0	0	0	9	5
	6–10	11	25	0	12	14	9	12
	>10	80	63	87	88	71	78	78

GP, general practitioner; NA, nurse assistant; AP, allied profession.

The mean value of number referred/1000 eligible patients in the first six months was 13. Four units reported lower levels, and two reported higher levels than the mean. CCQ scores range from 0 to 3. High CCQ scores indicate innovativeness in all dimensions except conflicts, where high CCQ scores indicate stagnation. When CCQ scores at the two units in each county council were compared, several differences were found (Table 9).

 Table 9. CCQ score, differences between the two units in each county council

CCQ-dimension	Cou	County council A	cil A	Cor	County council B	cil B	Col	County council C	oil C
	Unit AI (n=35) Score (SD)	d	Unit All (<i>n</i> =24) Unit BI (<i>n</i> =15) Score (SD) Score (SD)	Unit BI (<i>n</i> =15) Score (SD)	d	Unit BII (<i>n</i> =17) Unit CI (<i>n</i> =7) Score (SD)	Unit CI (n=7) Score (SD)	d	Unit CII (n=23) Score (SD)
Challenge	2.09 (0.50)	0.245	2.23 (0.43)	2.16 (0.26)	0.019	2.45 (0.37)	2.77 (0.21)	0.007	2.28 (0.43)
Freedom	1.74 (0.53)	0.921	1.73 (0.34)	1.49 (0.58)	0.147	1.76 (0.44)	2.06 (0.69)	0.578	1.92 (0.51)
Idea support	1.89 (0.66)	0.006	1.44 (0.45)	1.73 (0.37)	0.006	2.22 (0.53)	2.66 (0.46)	0.012	1.94 (0.66)
Trust/openness	1.87 (0.56)	0.011	1.52 (0.42)	1.84(0.52)	0.001	2.41 (0.31)	2.69 (0.51)	900.0	1.94 (0.60)
Dynamism/liveliness	2.01 (0.56)	0.000	1.42 (0.38)	1.75 (0.32)	0.000	2.25 (0.31)	2.66 (0.40)	0.011	1.95 (0.64)
Playfulness/humour	2.10 (0.49)	0.000	1.63 (0.46)	2.03 (0.41)	0.230	2.20 (0.39)	2.74 (0.19)	0.017	2.15 (0.61)
Debates	1.70 (0.61)	0.001	1.24 (0.33)	1.52 (0.46)	0.002	2.00 (0.32)	2.11 (0.66)	0.110	1.73 (0.50)
Conflicts	0.56 (0.55)	0.046	0.84 (0.47)	0.55 (0.40)	0.035	0.24 (0.40)	0.06 (0.10)	0.095	0.38 (0.49)
Risk taking	1.57 (0.54)	0.043	1.31 (0.37)	1.35 (0.50)	0.013	1.74 (0.34)	2.09 (0.67)	090.0	1.59 (0.56)
Idea time	1.31 (0.52)	0.253	1.17 (0.36)	0.85 (0.42)	0.000	1.49 (0.42)	1.43 (0.56)	0.601	1.30 (0.59)

The difference was significant for seven of the ten dimensions in county council A, eight in county council B and five in county council C. All significant differences were in favour of the same unit in each county council.

The overall lowest and highest CCQ scores were found at units AII (lowest in seven dimensions, highest in conflicts) and CI (highest in eight dimensions, lowest in conflicts), and are illustrated in Figure 3. The reference values for CCQ scores regarding stagnated or innovative organizations provided by Ekvall (1990) are also included in the figure.

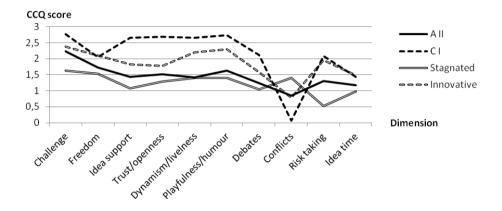


Figure 3. CCQ-values at the two units that scored the lowest and highest values; reference values for innovative and stagnated organizations are also shown.

Table 10 shows the probability of being referred to the CLT at one of the two units within each county council, according to implementation strategy and CCQ score. The unit considered having a high CCQ score in each county council reached a significantly higher score in at least five of the ten CCQ dimensions than the unit within the same county council considered having a low CCQ score. In county council A, the probability that a patient would be referred to the CLT was 6.5 times higher at the unit where the CCQ score was high and the explicit implementation strategy was used, than at the unit where the CCQ score was low and the implicit implementation strategy was used. The same tendency was seen in county council C, with a smaller, although significant difference. In county council B, where a low CCQ score coincided with the explicit implementation strategy, and vice versa, there was no difference in the probability that a patient would be referred to the CLT.

Table 10. CCQ score, implementation strategy and implementation outcome: comparison between the two units in each county council

County council	Unit	CCQ*	Implementation strategy	No. of eligible patients attending unit	Number referred	Referred/ 1000 patients	Risk ratio	Confidence interval
Α	ΑI	Н	Explicit	6867	210	31	6.53	4.32-9.89
	All	L	Implicit	5346	25	5	1**	4.32-9.09
В	ВІ	L	Explicit	4860	29	6	1**	0.74.0.00
	BII	Н	Implicit	4201	30	7	1.19	0.71–2.00
С	CI	Н	Explicit	2598	48	18	1.87	4 00 0 07
	CII	L	Implicit	3746	37	1 0	1**	1.22–2.87

^{*}H, high; L, low. The unit marked H reached a significantly higher score than the unit within the same county council marked L in at least five of the ten CCQ dimensions. ** Reference value.

Implementation strategy evaluated in terms of RE-AIM (Papers II and V)

The RE-AIM framework was used to evaluate the implementation after nine months and after 24 months with the CLT in operation. Results from the two measurements are presented for each of the RE-AIM dimensions. Some of the results presented in this section were not included in the papers. After 24 months most of the differences between strategies could be attributed to differences within the explicit and implicit groups. At the nine-month follow-up, differences within strategy groups were found only for the Reach dimension.

Reach

The dimension Reach was measured using one question about the frequency of referral (Appendix B, question 5a, Appendix C, question 11a). The response alternatives were daily, once a week, once a month, or never. At the ninemonth follow-up, the proportion of staff members who stated they do refer patients to the CLT (daily, once a week or once a month) was 83% at explicit units and 53% at implicit units (p=0.001). Significant differences, however, were also found between units within the explicit group (p=0.020) and within the implicit group (p=0.000), which means that the difference could not be attributed to strategy. The main reason for not referring patients to the CLT was forgetting. Weekly or daily referral was reported more frequently in the

explicit group than in the implicit group, but no significant differences were found between strategies or between the units within each strategy.

When data from the 24-month follow-up were analyzed, one unit in the explicit group had less than five responders. The results from this unit were not included in the analysis due to ethical considerations. This resulted in two explicit units (units I and II) and three implicit units (units III–V) being included in the analysis. Referral (daily, once a week or once a month) was reported by 78% of the responders at explicit units and 75% of the responders at implicit units. Reasons for not referring were forgetting, that it is not part of their duty, that they have other routines, but also that they do not believe in the concept. Weekly or daily referral was reported by 25% of the responders at explicit units and 3% of the responders at implicit units (p=0.006). All reports of weekly or daily referral, however, could be attributed to one of the units (unit I) in the explicit group. When unit I was compared with units II–V, the difference in weekly or daily referral was significant (p=0.000).

Effectiveness

Six of the questions/statements in the questionnaires (Appendix B, questions 6, 8–10, 12, 13; Appendix C, questions 7, 12, 15, 19, 20, 23) concerned the dimension Effectiveness, which is defined as the impact of the introduction of the CLT on staff members' attitudes and performance regarding lifestyle issues at the PHC unit. Answers to questions B 12 and C 23 were divided into two items in the analysis, thus seven items were captured by the six questions.

After nine months, significant differences according to strategy were found in four of the seven items assessed, all in favour of the explicit implementation strategy (p=0.011–0.045).

After 24 months, responders at the explicit units were significantly more positive than responders at the implicit units in four of the statements/ questions, but an analysis at unit level showed significant differences between the two explicit units in two of these. For the statements "It feels good/would feel good to refer...", and "I feel I can represent the advice...", no differences were found within the explicit group (units I and II), showing a possible difference according to strategy used (p=0.000, p=0.001). Staff at unit I reported

having read the advice provided by the CLT to a higher degree than staff at unit II (p=0.005).

Adoption

Adoption was measured as the proportion of eligible patients who performed the lifestyle assessment, and the proportion of eligible patients who performed the assessment and reported referral to the CLT by a staff member. Data were collected from the CLT database and county council registers.

At the nine-month follow-up, a significantly higher proportion of patients had performed the assessment (risk ratio (RR) 1.86, confidence interval (CI) 1.63-2.11) and a significantly higher proportion stated they had been referred to the CLT at explicit units than at implicit units (RR 2.49, CI 2.05-3.02).

After 24 months, data on referral based on months 19–24 were used as the outcome variable for Adoption. The proportion of patients who stated they had been referred to the CLT showed no difference according to strategy (RR 1.40, CI 0.83–2.33). The RR to be referred to the CLT at unit I compared with units II–V was 3.15 (CI 1.89–5.24).

Implementation

The nine-month follow-up questionnaire contained eight questions/statements (Appendix B, questions 5b, 5c, 5d, 5e, 5f, 5g 7, 11) concerning the dimension Implementation, defined as fidelity to the original ideas linked to the CLT; for example, are patients being referred, is the result discussed with patients, and is the CLT discussed among staff members. No significant differences between the two implementation strategies were found regarding this dimension after nine months.

For the 24-month follow-up, Implementation was assessed with seven questions/statements (Appendix C, questions 11b, 14, 16, 17, 18, 21, 22). At the explicit units, more positive answers were given for six of these questions (p=0.000-p=0.047), but all the differences could be attributed to differences between unit I and units II–V (p=0.000–0.002); within units II–V no differences were found (p=0.085–0.825).

Maintenance

Maintenance was not assessed until after 24 months, and was measured in terms of the proportion of eligible patients being referred to the CLT over time at the explicit and implicit units, but also for patients at unit I compared with patients at units II–V.

The proportion of patients referred to the CLT was assessed on a three-month basis. When strategies were compared, the proportions started at a higher level at the explicit units than at the implicit units. Over time, proportions decreased and the difference between the explicit and implicit units levelled off (Figure 4). When unit I was compared with units II–V, higher proportions of patients were referred at unit I, but with decreasing differences over time, as proportions at unit I declined (Figure 5).

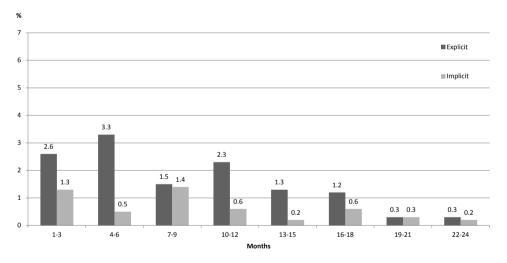


Figure 4. Proportion of eligible patients who performed the assessment and reported referral by staff. Outcome for the explicit and implicit strategies measured on a three-month basis.

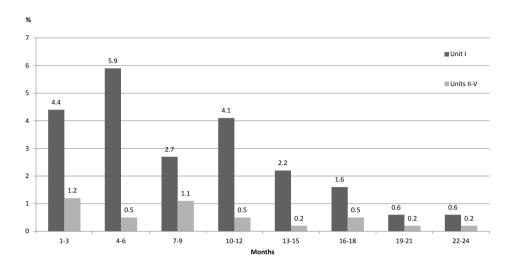


Figure 5. Proportion of eligible patients who performed the assessment and reported referral by staff. Outcome for unit I and units II–V, measured on a three-month basis.

Perceptions of the implementation process (Papers III and IV)

Usage of the lifestyle intervention tool and perceptions of the implementation

In Paper III, staff perceptions of the implementation (qualitative data from focus groups with staff members) were compared with the implementation outcome in terms of the proportion of eligible patients who performed the assessment and reported they had been referred by staff, measured after nine months. At one unit a significantly higher proportion of eligible patients had been referred, compared with each of the other units (Table 11).

Table 11. Probability that an eligible patient was referred to the CLT during the first nine months of the study at the six units according to strategy and in terms of the risk ratio

	<u>-</u>	Explicit strat	egy	Implicit strategy			
	Unit I	Unit II	Unit III	Unit IV	Unit V	Unit VI	
RR	1*	0.15	0.64	0.24	0.24	0.24	
(CI)		(0.11-0.20)	(0.49-0.82)	(0.18-0.33)	(0.19-0.31)	(0.18-0.33)	

^{*}Reference value.

The unit with the highest proportion of referred patients, a unit where the explicit strategy was used, from here is referred to as Explicit Adopters. The two other units where the explicit strategy was used are called Explicit Non-Adopters, and units where the implicit strategy was used are called Implicit Non-Adopters. The expression 'all groups' refers to Explicit Adopters, Explicit Non-Adopters and Implicit Non-Adopters. The results are sorted into four themes chosen from implementation theory: *Context, Dissemination, Perceived innovation characteristics*, and *Staff characteristics*, thus using a deductive approach. Also some of the categories in the analysis were chosen from implementation theory. Other categories and all sub-categories emerged from the analysis. The results are presented according to the themes, categories and, where appropriate, sub-categories. All themes, categories and sub-categories are displayed in Table 12; the themes and categories chosen from the implementation literature are also shown.

Table 12. Themes and categories used in the analysis in Paper III

THEME	CATEGORY	SUB	-CATEGORIES	
Context*	Working conditions	Work load	Organizational change	Staff situation
	Emotional	Loss of control/frustration	Норе	
Dissemination*	Decision making	Expectations	Involvement	
	Activities	Information	Trial	Support
	Obstacles	Routine not established	Staff performance	
Perceived innovation characteristics*	Relative advantage*	Advantage	Disadvantage	
	Complexity*	Complex	Not complex	
	Trialability*	Trialable	Not trialable	
	Observability*	Observable	Not observable	
	Compatibility*	Compatible	Not compatible	
	Reinvention*			
Staff characteristics*	Opinions about lifestyle issues in PHC	Importance	Possibilities	Obstacles
	Opinions about innovations, new routines and change	Positive to change	Reluctant to change	

^{*} Theme or category chosen from implementation literature.

Context

Working situations differed substantially between the units. Explicit Adopters described a heavy but not exceptional work load, continuing changes but no major organizational change, and a staff situation not affected by vacancies or sick leave. Explicit Non-Adopters reported experiences of a heavy but normal work load, managers or staff absent due to sick leave or vacancies, but no major organizational changes. Implicit Non-Adopters described a period of heavy work load, organizational changes and staff shortages. Staff at all units in the implicit group reported similar experiences.

The units where staff expressed perceptions at the emotional level were all part of the Implicit Non-Adopter group. They described feelings of frustration and loss of control due to organizational changes and shortage of staff.

Dissemination

Explicit Adopters expressed positive expectations about receiving the CLT, and discussed the concept in advance. Explicit Non-Adopters had no positive expectations, expressed a sense of indifference concerning the CLT, a lack of enthusiasm, or were even negative. Implicit Non-Adopters expressed scepticism, indifference, or were slightly positive. Staff did not feel involved in the decision to accept the CLT at any of the units.

Staff in all groups expressed having received enough information about the concept. The opportunity to try the assessment (offered at all explicit implementation strategy units) was mentioned by Explicit Adopters and Explicit Non-Adopters as a positive experience. Among the Explicit Adopters, some staff members did encourage their colleagues; the other two groups mentioned a lack of that kind of support. Staff in all groups complained about not having established routines for referring and thus forgetting about it.

Perceived innovation characteristics

Explicit Non-Adopters saw few advantages with the CLT, while the other two groups mentioned a number of perceived advantages. Trialability was mentioned not only by staff from the explicit implementation groups (where trying the assessment was part of the implementation strategy) but also by staff at units where the implicit strategy was used, who took the opportunity to try the assessment when providing it for patients. Ideas about reinventing the concept were mentioned by staff in all groups, suggesting that the

assessment should be performed before the consultation or that the receptionist could refer patients to the CLT. Explicit Non-Adopters had ideas about making the CLT self-distributing, so that staff should not need to refer patients. Implicit Non-Adopters and to some extent Explicit Non-Adopters had experienced problems with malfunctioning equipment.

Regarding compatibility, there were substantial differences between the groups. Explicit Adopters saw possibilities with the CLT, and believed that all patients could benefit from being referred. Explicit Non-Adopters saw very few possibilities with the CLT; it was not compatible with their routines and they felt there were better ways to address lifestyle issues. Among Implicit Non-Adopters some staff groups saw the possibilities, but overall they had more confidence in and felt more comfortable with referring patients to a lifestyle team at the unit. A common opinion was that the assessment provided by the CLT is too limited, as it focuses only on two lifestyle areas.

Staff characteristics

Staff opinions about addressing lifestyle issues in PHC did not differ between the groups. Participants in all groups were concerned about the issue and found it important, but lack of time and resources were mentioned as obstacles. Opinions about new ideas and new working methods were very positive among the Explicit Adopters. Explicit Non-Adopters were positive, but pointed out that too many changes cause reluctance. Among the Implicit Non-Adopters, opinions ranged from positive to reluctant to change.

Professional sub-cultures and perceptions of the implementation

In Paper IV, perceptions of the implementation were compared according to staff category, including managers. The results from the interviews are sorted into three main areas: *implementation preconditions, opinions about the CLT*, and *opinions about usage*, and are divided into categories emerging from interview data. Areas and categories are presented in Table 13. The results presented in this section include data not previously published.

AREA	CATEGORIES		
Implementation preconditions	Expectations	Involvement	Perceptions of the introduction
Opinions about the CLT	Compatibility	Advantages	
Opinions about usage	Performance	Obstacles	Solutions

Table 13. Main areas and the categories that emerged from the analysis in Paper IV

Implementation preconditions

Managers expressed openness and curiosity. They perceived prevention as an important task and felt a responsibility to provide preventive services. Information about the CLT was perceived as relevant, but the managers thought it would have been more effective if given to smaller groups. Managers also mentioned the structural dimensions of the implementation, such as the lack of a local plan for action.

Positive expectations among managers were not shared by the GPs, who expressed indifference and lack of enthusiasm. GPs seemed tired of neverending changes and many changes seemed to be perceived as threatening to their independence. When GPs mentioned information about the CLT they described it as good, but as being intended for someone else. They felt no need for the CLT, as they already integrate lifestyle issues as part of their daily work.

In contrast to GPs, nurses were more interested, and expressed how they looked forward to receiving the CLT. The overall attitude regarding changes was positive and curious, and they seemed eager to develop their work. Among nurse assistants there was a sense of acceptance without enthusiasm. Their opinions about change described openness to innovative changes, but more of just letting things happen. They pointed out professions other than themselves as more suitable for addressing lifestyle issues.

Opinions about the lifestyle intervention tool

Managers described the CLT as compatible with PHC, and perceived that it is currently topical to work with lifestyle issues and to use technical solutions to do this. GPs expressed reluctance by pointing out that the CLT could be of value not for themselves, but for other staff groups, such as nurses and nurse assistants. Nurses found the CLT compatible with their work and with PHC as a whole but also mentioned advantages for nurse assistants. Among nurse

assistants less compatibility was perceived, as they seemed to lack the confidence to discuss lifestyle issues with patients. Informants from all professional groups were concerned that the assessment only addressed two lifestyle areas, and technical problems were mentioned by all professional groups except GPs.

Opinions about usage

Informants in all professional groups and managers realized that fewer patients than expected had performed the assessment provided by the CLT Managers seemed surprised by this fact, and also expressed feelings of disappointment, resignation and self-criticism. GPs, in contrast, seemed unconcerned about bad performance and expressed no self-criticism. The main obstacle regarding the use of the CLT mentioned by GPs was forgetting. Nurses, on the other hand, expressed a high level of self-criticism; they had an ambition to refer patients and were disappointed that they rarely did. The lack of established routines was also seen as an obstacle. Nurses also noted that nurse assistants, at least at some units, referred patients more frequently than they did themselves.

Nurse assistants were aware of the low performance in their own group, but referring patients to the CLT did not seem to be prioritized, and forgetting and lack of time were mentioned as obstacles. Suggestions for improvements made by nurse assistants were, for example, to display signs and advertisements about the CLT, in order to make referral unnecessary, thus expressing reluctance to incorporate the CLT into their daily work. At one unit, nurse assistants did show enthusiasm and seemed to have embraced the idea of using the CLT as it was intended.

GENERAL DISCUSSION

The results from the five papers are discussed according to the synthesized implementation model described earlier, focusing on the four areas *context*, *adopters*, *implementation activities* and *the innovation*. Many of the findings are consistent with findings from other settings and from other parts of the world, and theories built on former research proved to be useful for application in Swedish PHC.

The main findings regarding the context were that a positive organizational climate seemed to influence implementation in a positive way, and that organizational changes or staff shortages coinciding with the implementation process had a negative influence on outcome. Regarding adopters, perceptions of the implementation seemed to be influenced by the existing professional sub-cultures; managers were visionary, GPs reluctant, nurses open and nurse assistants showed indifference. Positive expectations among staff were associated with positive implementation outcome. The activities, in this case the two implementation strategies, when evaluated, showed that the explicit strategy tended to be more effective in the short term. From the long-term perspective, the differences levelled off. Perceptions of the innovation associated with successful implementation were compatibility and relative advantage.

Context

Context was studied using a quantitative method, comparing organizational climate to implementation strategy and implementation outcome, but also in the qualitative part of the study where staff and managers described their perceptions of the situation coinciding with the implementation of the CLT. Organizational climate was considered an important contextual factor and was measured before the CLT was introduced. Organizational climate has previously been found to be of importance for innovativeness in organizations, and to influence quality of care. In a study of team functioning and IT innovation, Gosling et al. (2003) assessed team climate for innovation. The authors found a significant association between team functioning and improved patient care after the use of an online evidence system. When the

relationship between organizational climate and quality of chronic disease management was assessed by Benzer et al. (2011), a positive relation between what the authors define as a relational climate and diabetes care process adherence was found.

In the present study, organizational climate varied substantially between the participating units, and after nine months a possible association between a creative climate and implementation outcome was found. The CCQ instrument that was used for the assessment has been used previously in health care settings in Sweden. Norbergh et al. (2002) compared staff at four nursing homes and found significant differences between the units in nine of the ten dimensions assessed. The authors also found differences in care; residents spent more time with nursing staff at the units with a creative climate than at the units with a less creative climate. Boström et al. (2007) studied staff in elderly care and compared those who reported that they used research findings in their work with those who did not. Staff reporting research use scored higher than others in six of the ten CCQ dimensions, findings that could be compared with the results in the present study. However, no significant association could be found between a high CCQ score and research use (Boström et al. 2007).

Greenhalgh et al. (2005), when discussing contextual factors, mentions "slack resources", defined as a variable that "reflects the resources an organisation has beyond what it minimally requires to maintain operations" (p. 136). Slack resources have been shown previously to have a significant positive association with organizational innovativeness (Damanpour 1991). A model that included the contextual factors organizational size, slack resources and organizational age, together with the climate variables risk orientation, external orientation and achievement orientation, was used in a study of the adoption of imaging technology performed by Nystrom et al. (2002). The model developed was found to explain over 50% of the variance in innovativeness between organizations. In the present study, heavy work load, organizational changes, and staff shortages were themes discussed by staff as well as by managers, who also believed that this explained why implementation was not as successful as expected. At units that went through these experiences, the slack appears to have been tightened up, as all resources were required to maintain the essential operations at the unit, and there was no energy left for engaging in the implementation of the CLT.

One way to explain how organizational factors may hinder or facilitate an implementation process is in terms of structure, process and outcome, according to Donabedian (2005). If the contextual structure does not allow the process, no positive outcome can be expected. This may have been the case at some of the units included in the present study.

Adopters

Adopter characteristics at the group level were examined in the qualitative part of the study. Perceptions of working with lifestyle issues and perceptions of the implementation were assessed. Adopter characteristics were also, to some extent, assessed by the questionnaires.

The results from the questionnaires showed that most participants expressed interest in preventive issues, and also agreed to the advice provided by the CLT. Personal values corresponding to program intentions previously have been shown to be associated with sustainability (Edvardsson et al. 2011). The interest in preventive issues expressed by staff in the present study may have been important for the decision to participate in the study, but did not seem to be sufficient to ensure maintenance over time. Also at the unit where staff were characterized by high expectations and perceptions of compatibility, the proportion of referrals decreased substantially after the first year.

In general, staff at all the units were concerned about lifestyle issues, and found the task very important. However, perception of the priorities, who should be responsible for the task, and opinions about new ideas and new working methods varied. Rogers (2003) categorized adopters according to their innovativeness in terms of rate of adoption. In the following, the adopter categories described by Rogers (2003) are applied to staff groups at the participating units and compared, not measuring how fast they adopted, but to what extent they adopted the innovation at the group level. It would be wrong to assume that all members of a group have the same characteristics, but as members of a group are influenced by and adapt to prevailing norms and attitudes (Mittman et al. 1992, West et al. 1999), the categorization can be applied also at the group level. The categorization presented by Rogers, however, should be used with caution as an explanatory variable, as it has not been rigorously tested in relation to service sector innovations (Greenhalgh et al. 2005).

At both the nine-month and the 24-month evaluations, implementation outcome in terms of the proportion of eligible patients being referred to the CLT, was significantly higher at one unit than at any of the other units. Interviews revealed that attitudes to new ideas and new working methods were very positive at this particular unit. Defined according to Rogers (2003), they could be characterized as early adopters, making judicious decisions and adopting an innovation after the innovators, but not too far ahead of the average individual. Staff at the most successful unit also were found to have positive expectations regarding the CLT, a factor that seems to have influenced the implementation also in the long term.

At two of the units, staff expressed positive attitudes to innovations, but they were also eager to mention that too many changes do cause reluctance. They were not ready to adopt the CLT without hesitation. Staff at this unit could be characterized as early majority, defined by Rogers (2003) as those who deliberate for some time before adopting a new idea, and with a longer innovation-decision period than early adopters.

At the units that had the lowest proportion of referred patients there were positive voices regarding change among the staff, but there were also those who were reluctant to make changes, enough to be categorized as late adopters. They expressed how they fear changes, and they want to be sure about the advantages of a new way of working before trying it. According to Rogers (2003), late adopters approach innovations with a sceptical and cautious air, and most of the uncertainty about a new idea must be removed before they feel it is safe to adopt.

When experiences in the professional staff categories were compared with managers' experiences, differences were found. Existing professional subcultures in health care seem to have influenced the implementation of the CLT. Studies assessing how different professionals respond to implementation efforts are scarce. Légaré et al. (2008), who performed a review of articles focusing on barriers and facilitators to implementing shared decision making in clinical practice, concluded that most studies focus only on physicians. In Swedish PHC, the implementation of innovative attitudes and behaviour was assessed by Morténius et al. (2011), comparing professional groups at a seven-year follow-up. The group that included nurses, physiotherapists and occupational therapists was found to have adopted a positive attitude towards new thinking and had progressed to a phase at which they changed work

practices. This was not the case in the groups that included physicians or nurse assistants (Morténius et al. 2011).

In a Dutch study, Helmink et al. (2011) found nurses less positive than physiotherapists about implementing and continuing a lifestyle intervention programme in general practice. Among general practice staff in Australia, Christl et al. (2010) found that GPs scored higher on the readiness for organizational change scale than other staff groups including nurses, allied professionals and administrative staff. Nygaard and Aasland (2011), on the other hand, found GPs reluctant to change in a study that assessed the implementation of SBI in general practice in Norway. When Stenberg and Wann-Hansson (2011) performed a qualitative study to evaluate the implementation of fall prevention guidelines, nurses and physicians were the ones most eager to participate in the group discussions, in contrast to physiotherapists and occupational therapists. This could reflect a hierarchy in the natural surroundings, or that the subject appealed more to nurses and physicians than to the other groups (Stenberg & Wann-Hansson 2011). Johansson et al. (2010b) studied attitudes to a more health-promoting health service taking into account profession and gender, and found that men and physicians reported less positive attitudes. As these groups often have positions of power, this may play a critical role in influencing the implementation of preventive services (Johansson et al. 2010b).

The results from the present study and from former research described above are inconclusive about innovativeness in the different health professional categories. It could be hypothesized that the willingness of a certain professional group to adopt a certain innovation depends more on the characteristics of the particular innovation, and to what extent it is perceived as useful for the professions. This could be referred to as the fit of the innovation to targeted users, as described by Klein and Speer Sorra (1996). However, the existing sub-cultures are important factors in health care, and the possibility of tailoring implementation activities to the different professional groups is discussed further in the next section.

The adopters' influence on the outcome of implementation can also be discussed in the light of behavioural change theory. In the present study, adopters were evaluated mainly at the group level, which makes theories regarding social interaction more useful than theories focusing on individual professionals. The social cognitive theory of Bandura (1986) assumes that there

is a continuous interaction between a professional, his or her performance and the social environment. This is consistent with the results showing differences between units and between professional groups, and also links the influence of adopters to the influence of context.

Implementation activities

The main part of the study investigated implementation activities, as two strategies for implementation were used and evaluated. The intention was to compare two strategies that did not differ too much in design or cost, thus differences according to strategy were relatively small. The explicit theory-based strategy offered a trial period for staff and a second decision session, two factors that were absent in the implicit strategy. Both strategies were low-cost approaches, and could be used in any primary care setting without allocation of additional financial resources. It is well known that high-cost approaches give better results (Nutley et al. 2007), but such resources are rarely available. The explicit strategy was found to be more effective than the implicit strategy regarding the RE-AIM dimensions of Effectiveness and Adoption after nine months, indicating that a theory-based approach could be more effective, despite limited financial resources, at least in the short term.

The choice of comparing a theory-based strategy with a commonly used strategy opens a discussion about what contributions theory can make in an implementation process. One benefit of using theory could be that it guides the implementation actors to use methods that have been evaluated previously and found to be effective. The explicit strategy used in the present study included activities that were supposed to support the decision to adopt the innovation among staff. The persuasion and decision stages in Rogers' innovation-decision theory (Rogers 2003) were facilitated by the one-month trial of the CLT and by the decision session arranged with the researcher visiting the unit. These factors may have facilitated the decision to adopt in the short term. They also added a bottom-up perspective to the explicit strategy, were mainly top-down approaches though both strategies (Hill & Hupe 2002).

Another way to facilitate implementation is to tailor the implementation activities to the specific setting, which was not done in the present study. A Cochrane review from 2010 provides an overview of how interventions have

been tailored to overcome barriers to change (Baker et al. 2010). The authors conclude that tailored interventions are more likely to improve professional practice than dissemination of guidelines or educational material. However, it is still unknown how to effectively identify barriers or how to select interventions likely to overcome these (Baker et al. 2010). Another reflection from the authors is that the cost-effectiveness of tailored interventions has not been evaluated, and the use of low-cost approaches is reasonable (Baker et al. 2010).

In the present study, a high CCQ score, indicating a creative climate, seemed to facilitate implementation. Similarly a low CCQ score could have been a barrier to implementation. If CCQ had been assessed before the strategies were developed, a strategy that addressed the organizational climate could have been used and possibly resulted in better outcome. This method of identifying barriers before implementation was evaluated by Sciamanna et al. (2004) who studied the implementation of computer-tailored health behaviour communications in primary care settings. Barriers to change were identified in advance, and a practice-specific implementation plan was designed for each practice, tailored to address those barriers. Despite this, adoption of the program was lower than expected (Sciamanna et al. 2004), showing that tailoring is no guarantee for implementation success. When intervention tailoring for quality improvement was studied by Ruhe et al. (2009), the authors found that assessment of key stakeholders' motivations, external influences, resources and opportunities for change, and also the interactions between these factors all needed to be taken into account.

A literature search for articles describing implementation activities in health care settings provides a wide range of suggestions for strategies to facilitate implementation, some based on theory, others not. Ubbink et al. (2011), who studied implementation in a hospital setting, applied professional and managerial role models and suggested that an implementation strategy should be a multifocal comprehensive program for all the professionals involved and tailored to their desires and perceived barriers. This links to the findings presented in this thesis, indicating that professional sub-cultures should be taken into account in the planning and execution of an implementation process. Different health professions have been shown to respond to different forms of evidence (Ferlie & Dopson 2005), and it could be assumed that strategies tailored for the different professions have the potential to improve outcome.

Regarding sustainability of the new method implemented in practice, there was no difference according to strategy used in the present study, and sustainability was low at all units when measured after two years. One unit, however, had a more positive implementation outcome than any of the others. The unit was part of the explicit group and had a CCQ score indicating innovativeness, characteristics shared by one of the other units as well. One explanation could be that the unit with better outcome was a learning organization to a higher degree. Learning organizations are characterized by their skills in acquiring and transferring knowledge, which then is used to modify behaviour within the organization (Garvin 1993). This could explain why the components of the explicit strategy were more successful at this particular unit.

A study performed in a Swedish psychiatry setting compared two different strategies for the implementation of guidelines (Forsner et al. 2010). One was a passive dissemination of guidelines, the other included local implementation teams, seminars, regular feedback and academic outreach visits. A two-year follow-up found that compliance with guidelines increased and was sustained over time at units where the active strategy was used (Forsner et al. 2010). Compared with the explicit strategy in the present study, the activities provided were substantially more active, which could be one explanation for the successful outcome. Such activities, however, are also more resource demanding and are not always feasible.

Reminders and incentives are often used to achieve sustainability. In the present study, reminders in terms of regular feedback to staff were part of both implementation strategies. However, the reminders were sent only to the manager and the liaison at each unit, and whether or not it reached all staff members depended on routines in the local setting. Successful examples of reminder systems have been described previously. A reminder system for evidence-based therapy for chronic heart failure was shown to partially overcome the implementation problems in a German study (Braun et al. 2011), and computer-delivered prompts were successfully used in a theory-based study of guideline implementation in England (McDermott et al. 2010).

Incentives have been shown to increase implementation results but are not always useful in the long term (Grossbart 2006, Nutley et al. 2007), and according to a recently published Cochrane review, evidence to support or not support the use of financial incentives to improve the quality of PHC is

insufficient (Scott et al. 2011). A study in Sweden found that simplified routines had a greater effect than economic incentives on the implementation of prescribing physical activity among PHC physicians (Persson et al. 2010).

Another way to support sustainability is to appoint program champions, described by Greenhalgh et al. (2005) as "Individuals who dedicate themselves to supporting, marketing, and 'driving through' an innovation" (p. 126). The role of champions in health care settings has been favourably evaluated by Parrish et al. (2009) and by Damschroeder et al. (2009). The latter concluded that, if significant behavioural change is required, a coalition of champions may be needed.

The innovation

The study performed for this thesis involved the implementation of one specific innovation, the CLT. The qualitative approach gave an opportunity to assess staff perceptions of the CLT, and how these might have influenced the implementation, and the 24-month questionnaire contained questions regarding opinions about the CLT. It is probable that sustainability was also influenced by staff perceptions of the CLT.

Innovation characteristics crucial for the diffusion of innovations have been identified by Rogers (2003). Perceived advantage is a characteristic that seemed to influence the implementation of the CLT. At the unit where the CLT was perceived to have advantages compared with how lifestyle issues had been addressed previously, a higher proportion of patients were referred. Some of the units had well-functioning lifestyle teams, and it seems that this decreased the perception of relative advantage. Staff found the existing routines superior to using the CLT.

Another characteristic found to influence the implementation was compatibility with existing routines. The perception of compatibility was mentioned in staff groups at units with comparatively high rates of referral to the CLT. Similar findings were described by Sciamanna et al. (2004) who studied the implementation of computer-tailored health behaviour communications in primary care settings. One of the most significant barriers to the incorporation of the computer program into routine care found in that study was that the program was viewed overall as being inconsistent with

practice workflow (Sciamanna et al. 2004). This confirms the results from a meta-analysis performed by Tornatzky and Klein (1982), who, across studies, found that compatibility and relative advantage were the two attributes of an innovation that had the strongest positive relation to adoption.

A barrier to adoption mentioned by Sciamanna et al. (2004) was technical problems, which could be referred to as complexity of the innovation. This factor was also identified in the present study. Staff at some units with low referral rates had experienced and mentioned technical problems.

The physicians were the profession in this study who commented on the observability of the innovation. They lacked the possibility to take part of the lifestyle assessment results, and thought that the CLT would be more useful if the results were discussed with patients. Rogers stated that the more visible the results of an innovation, the more likely it will be quickly adopted (Rogers 2003). The feedback provided by the research team, showing risk levels among patients who performed the assessment, was an attempt to make the results observable, but seems not to have achieved this goal.

Trialability, the degree to which an innovation can be experimented with on a limited basis, was an important factor in the present study. A trial period was part of the explicit implementation strategy. Staff at explicit units expressed satisfaction with having had this opportunity. The fact that the explicit strategy was more successful in the short term also indicates that the possibility to try out and get acquainted with the CLT had a positive influence. When trialability is discussed in the literature, however, it becomes clear that the construct is quite easy to evaluate at the individual level but becomes complex when applied in an organizational setting (Greenhalgh 2005). The trial of an innovation at the organizational level tends to go hand in hand with its adaption to context, in other words its reinvention, which is discussed below.

In the interviews, staff made a number of suggestions for reinvention, i.e. how the CLT could be made more interesting to patients, and also ideas about how to help individual staff members to remember to refer patients to the CLT. Reinvention of how to use the CLT was allowed, but despite a number of ideas mentioned in the interview sessions, it seemed not to have occurred during the study period. Modification of the program was also mentioned in the study performed by Sciamanna et al. (2004), where staff suggested that the program should be shortened and modified to increase use.

An overall perception of the CLT, mentioned at all the units, was that the lifestyle assessment provided was too limited, which might explain the overall low implementation outcome. Staff wanted a more comprehensive assessment including dietary habits and tobacco use. The computer program provided by Sciamanna et al. (2004) included the two lifestyle areas of physical activity and smoking. In that study, modifications of the program suggested by staff members were to include other programs pertinent to primary care, e.g. scanning for depression. When the literature was searched, no evaluation of the implementation of a more complete computer-based lifestyle intervention program was found. Thus, it is hard to tell to what extent the perception of the assessment being too limited influenced the adoption at the setting level, and if a broader program would have facilitated adoption.

Implementation outcome

Summarizing the results of the implementation process described in this thesis, there are a number of explanations as to why adoption varied between the units, and why sustainability was not achieved. The four main factors of the synthesized implementation model all seemed to influence adoption, and it is hard to determine which one is the most important. The contextual factor, creative climate, which was measured in advance, showed significant differences between units, but scores at baseline were not generally higher in the explicit group than in the implicit group. CCQ was assessed only at baseline, as no efforts were made to influence the organizational climate. However, changes may have occurred during the study period due to factors beyond the influence of the researcher. After nine months, the explicit strategy tended to be more successful than the implicit strategy, but after two years the strongest difference was found between one of the units and all the others. This difference cannot be attributed either to strategy or creative climate. Findings from the qualitative study performed after nine months indicate that positive expectations, compatibility with existing routines and perceptions of relative advantage were important.

The overall proportions of patients being referred to the CLT were lower than expected, with less than 1% of eligible patients at explicit and implicit units at

the two-year follow-up. Low rates of adoption were also found in the study performed by Sciamanna et al. (2004), where in a group of highly motivated, highly selected primary care providers, only one of ten practices was able to incorporate the program into routine care. This shows that changing practice is difficult even in a setting where motivation is high.

Lessons learned from this study are that, when an implementation process is planned, the use of theory can be helpful for the choice of implementation strategy, and to guide the activities. To achieve sustainability, however, it seems that continuous effort is needed. This makes the implementation more economically demanding, but could be a good investment if the desired change of behaviour is achieved and sustained.

It could be of value to assess contextual factors in advance, and interventions tailored to address contextual factors and adopter characteristics, e.g. different professionals, might have increased implementation outcome. Factors related to the adopters and to the innovation, like expectations and perceptions of compatibility and relative advantage, seem to be more important over time than the strategy used for the introduction. To achieve broad implementation of the CLT, it should first be modified to meet staff expectations. When similar tools or new practices are being implemented in Swedish PHC, the findings from this study might be useful.

METHODOLOGICAL DISCUSSION

Strengths and limitations

The nature of this study involves some strengths but also a number of limitations that must be considered when interpreting the results.

Strengths

The use of both quantitative and qualitative methods is a strength in the study, as it provides the opportunity to study implementation from different perspectives. Where quantitative methods were applied, both self-reported data from staff and register data were considered. The response rates for the staff questionnaires were high, and a drop-out analysis showed no differences between responders and the invited group. The use of the RE-AIM framework gave an opportunity to compare outcome at nine and 24 months in a structured way. Another strength was that the six PHC units participating in the study varied in size, catchment area and services provided. The differences in contextual factors reflect the situation in Swedish PHC and help to widen the perspective. All the units volunteered to participate, and could be considered highly motivated to participate in the study, at least at management level.

The interviews performed in Papers III and IV were conducted with the different staff groups separately, which allowed the individuals to reveal their thoughts without fearing the reactions of staff members from other categories. It is well known that PHC is a hierarchic organization, and a mixed group might have hindered an open discussion. In order to expand knowledge about how the different sub-cultures in health care influence implementation issues, all possible professions, even those with only a few staff members, were incorporated. This added an important dimension to the study, making the picture more complete. However, most of the informants were nurses and GPs, corresponding to the number employed.

Limitations

One limitation is the small number of participating units. When units were compared, significant differences regarding implementation outcome were found, but a higher number of participants would have given more possibilities for statistical analyses including associations between the factors assessed. The selected units were thought to be representative regarding the variables measured, but the fact that there was no random sampling among all PHC units in the county councils affects the generalizability of the results.

Another limitation was that one important outcome value, the number of referrals to the CLT, was based on patient self-reporting within the lifestyle assessment. Patients who were referred by a staff member but chose not to perform the assessment were not registered. An attempt to evaluate to what extent referred patients actually performed the lifestyle assessment failed due to the low number of patients performing the assessment during the selected dates. Thus, it cannot be determined if lack of compliance was equal at all participating units, or if it differed and might have affected the overall results.

The design of the study also caused some difficulties in the use of data from county council registers. The number of referrals was compared with the number of eligible patients, i.e. unique individuals who had visited the unit during a specific period. Patients attending the units several times in a short period of time were not supposed to be referred to the CLT at every visit. Thus, monthly registering could not be used, and a calculation for mean values of unique individuals from a longer time period was made.

Only a limited number of factors influencing implementation outcome were evaluated in the study. Implementation is a complex process, and several factors not measured in this study could have affected outcome, for example, adopter characteristics at an individual level, outer context and networks. Other factors influencing implementation and sustainability, such as the presence of local opinion leaders, leadership at the unit and other interventions coinciding, were not included in the study design, but might have influenced the outcome. The factors assessed, however, have all been found to influence implementation outcome in a significant way in previous studies.

The implementation process studied concerned one specific innovation in the lifestyle intervention area, which is a limitation. Implementation of other innovations in PHC settings may follow other patterns.

Study design

A quasi-experimental design, as used in this study, involves an intervention but lacks randomization and an equivalent control group (Polit & Beck 2012). Three units, one from each of the three county councils, were randomly assigned to the explicit implementation strategy and the other three formed a comparison group. The comparison group was not matched and thus could be considered non-equivalent (Polit & Beck 2012). Assignment to strategy was performed at a cluster level, which was also considered in the analysis. Effects of the intervention were measured after six, nine and 24 months, which could be defined as a post-test only design (Polit & Beck 2012).

The present study focused on a complex research question, which is why both quantitative and qualitative approaches and both deduction and induction were applied. The use of quantitative and qualitative methods could be referred to as a mixed method, a pragmatic way of using the strengths from both post-positivist and constructivist approaches, as described by Tashakkori and Teddlie (2003). Mixed methodology is especially suited when neither a qualitative nor a quantitative approach, by itself, is adequate to address the complexity of the research problem (Creswell & Plano Clark 2007). In the pragmatist paradigm, the research question is more important than the methods used, and both deduction and induction are considered important (Polit & Beck 2012).

Another important question regarding the design of the study is the choice of implementation strategies. It could be argued that the strategies did not differ much, and that the implicit strategy from the beginning had a low chance of success. The implicit strategy, however, is a commonly used method for implementation of new tools in PHC. The hypothesis was that a better implementation outcome could be achieved by the addition of activities based on implementation theory, but still requiring minimal financial resources. Such low-cost activities, if found effective, could be feasible for widespread implementation in a health care organization. The aim was to study the implementation of an innovation in PHC and identify factors that influenced

outcome. The design selected for the study allowed the assessment of such factors under, what is often called, real-world circumstances.

Validity of research methods

A number of instruments and models were used for data collection and analysis. The CCQ, used previously in similar studies, is a validated instrument with acceptable predictive reliability (Mathisen & Einarsen 2004). The questionnaires used in Papers II and V were developed for the present study. The face validity of these questionnaires was obtained by a group of experts who thoroughly examined and discussed the questions. The questionnaire used at nine months was also tried by staff at a PHC unit with experience of the CLT, not participating in the study, and their comments were taken into account for the final version, in accordance with recommendations in Streiner and Norman (2008).

The validity of qualitative data can be described in terms of credibility, authenticity, criticality and integrity (Polit & Beck 2012). Credibility refers to confidence in the truth of and interpretations of data. Credibility in the qualitative parts of the present study is demonstrated by quotations from the interviews provided in the papers. Authenticity, inviting the reader into an experience of what is being described, is also provided by the quotations. Criticality and integrity, reflecting the author's critical appraisal of decisions made and self-scrutiny to ensure that interpretations are grounded in data, were insured by the cooperation between the authors. In the analysis process, the interpretation of findings was continuously discussed until consensus was reached.

The methodology of focus group interviewing was considered suitable for the present study, as it enables the researcher to study a particular topic from the group participants' perspective and allows the study of how views are constructed and expressed in a context of discussion (Wibeck et al. 2007). The ideal size of a focus group is five to eight members. Larger groups can be difficult to control and may inhibit each member's opportunity to contribute (Krueger & Casey 2009) and groups with less than five participants may fail to generate sufficient interaction (Polit & Beck 2012). The largest group in this study consisted of seven members. Other groups, however, had less than five participants and the smallest groups had only two participants. This was

because staff members who had signed up for the interviews did not arrive, and was beyond the control of the researcher. It is possible that larger groups would have revealed more information to the study. Another limitation was that some professional groups were too small to form focus groups. That was the reason why allied professionals, when present, were included in the same group as nurse assistants, and individual interviews were performed with nurse assistants at two of the units. This procedure may have limited the amount of information gathered.

The RE-AIM framework provides a structured method of handling data regarding interventions in the public health area, as well as the implementation of such interventions (RE-AIM 2011). In the present study the structure provided by the RE-AIM framework helped to evaluate implementation measured by quantitative variables.

CONCLUSIONS AND FUTURE RESEARCH

Conclusions

The study has contributed to knowledge on factors that influence implementation. The general conclusion is that when theory was applied in the implementation of a lifestyle intervention tool in Swedish PHC, factors related to the adopters and to the innovation seemed to be more important over time than the strategy used. Staff expectations, perceptions of the innovation's relative advantage, and potential compatibility with existing routines, were found to be positively associated with implementation outcome.

Conclusions from Papers I-V are that:

- A creative organizational climate, when combined with a theory-based, explicit, implementation strategy, including a trial period and allowing staff to try the innovation before using it in their daily practice, is associated with a positive implementation outcome in the short term.
- A theory-based, explicit, implementation strategy may result in a positive implementation outcome in the short term, regarding the RE-AIM dimensions Adoption and Effectiveness.
- Factors influencing implementation outcome are expectations among staff and perceptions of the innovation's relative advantage and potential compatibility with existing routines. Major organizational changes concurrent with implementation seem to affect outcome in a negative way.

- Among managers and professional groups, perceptions of the implementation of an innovation in PHC appear to be influenced by values, beliefs and behaviour associated with the existing professional sub-cultures.
- Differences in outcome that could be attributed to the implementation strategy at the introduction level off over time, and after two years other factors, such as expectations among staff and characteristics of the innovation, seem to be more important for sustainability.

Suggestions for future research

There is a paucity of research regarding the implementation of innovations, technological as well as administrative, in Swedish PHC, and further studies need to be conducted.

More comprehensive implementation activities, such as the allocation of a program champion with a commission to support the implementation, need to be evaluated. Implementation activities tailored to meet differences in organizational climate, or tailored to meet professional needs, considering the different sub-cultures, are other possible research subjects. Such implementation activities should also be evaluated in terms of cost-effectiveness.

The study population in the present study consisted of staff at six PHC units. A larger study population would increase the possibilities of conducting a randomized controlled trial to study the implementation of innovations in PHC.

SVENSK SAMMANFATTNING (SUMMARY IN SWEDISH)

Under senare år har intresset ökat för hur ny kunskap, forskningsresultat, nya verktyg och nya sätt att arbeta, implementeras inom hälso- och sjukvården. Forskningen har kunnat påvisa faktorer som påverkar implementeringen och ett antal modeller och checklistor att följa i planering och genomförande av en implementeringsprocess har tagits fram. Fortfarande finns det dock kunskapsluckor avseende vilka tillvägagångssätt som bör användas beroende på vilken innovation det gäller, och i vilken miljö denna ska införas. Primärvården är ett område där det saknas studier av hur nya metoder överförs till praktik. I Sverige har primärvården ett uppdrag att tillhandahålla inte bara hälso- och sjukvård utan också att verka förebyggande. Det hälsofrämjande arbetet försvåras av brist på tid, kunskap och kompetens, hinder som skulle kunna övervinnas med hjälp av modern teknik. Syftet med denna avhandling har varit att, med hjälp av teorier inom implementeringsforskningen, identifiera faktorer som kan ha betydelse för implementeringen av ett datorbaserat verktyg för livsstilsintervention inom svensk primärvård.

Sex vårdcentraler, två från vart och ett av tre landsting i sydöstra Sverige, rekryterades till studien. Ett datorbaserat verktyg för livsstilsrådgivning, ett "livsstilstest", introducerades på enheterna. Två olika strategier användes vid införandet; en teoribaserad, "explicit" strategi för att underlätta processen och en enklare, "implicit", strategi. Datainsamling genomfördes vid studiestart och efter sex, nio och 24 månader. Frågeformulär till personal och chefer skickades ut via e-post, och data hämtades även från livsstilstestets databas och statistik från respektive landsting. Vid studiestart innehöll frågeformuläret bland annat ett instrument som mäter organisationsklimatet på enheten. Efter nio månader genomfördes intervjuer med personal i fokusgrupper eller enskilt, och enskilda intervjuer med respektive vårdcentralschef. Resultatet av implementeringen mättes som andel patienter som hänvisats till livsstilstestet, och med hjälp av utvärderingsinstrumentet RE-AIM. Intervjuerna användes för att studera hur implementeringsprocessen uppfattats av cheferna såväl som av personal inom de olika yrkesgrupperna.

Resultat från studien visar att ett kreativt organisationsklimat, i det korta perspektivet, påverkar implementeringen positivt om det sammanfaller med implementeringsstrategi. Organisationsförändringar sammanfaller med implementeringen tycks ha en negativ effekt. Den explicita implementeringsstrategin gav ett något bättre utfall än den implicita strategin i det korta perspektivet, men skillnaderna utjämnades över tid. De professionella subkulturer som finns inom hälso- och sjukvården tycks ha påverkat hur implementeringsprocessen uppfattades av cheferna och av personal inom de olika yrkesgrupperna. Cheferna hade en visionär inställning implementeringen av livsstilstestet, läkarna sjuksköterskorna öppna och positiva medan undersköterskorna föreföll vara likgiltiga inför införandet av det nya arbetsredskapet. Positiva förväntningar, upplevelsen av att det nya arbetsredskapet var kompatibelt med rådande arbetssätt, och att det hade fördelar jämfört med hur man arbetat tidigare, var kopplade till ett positivt utfall av implementeringen. Livsstilstestet, som omfattade frågor om alkoholkonsumtion och fysisk aktivitet, uppfattades som alltför begränsat, vilket kan vara en förklaring till att det inte inkorporerades i verksamheten i någon avgörande utsträckning.

När teorier hämtade från implementeringsforskningen användes för att studera implementeringen av ett datorbaserat verktyg för livsstilsintervention inom svensk primärvård, visade det sig att faktorer förknippade med användarna och med innovationen hade större betydelse för utfallet än den strategi som användes. Den teoribaserade, explicita, strategin hade en positiv effekt på implementeringsutfallet framför allt då den sammanföll med ett kreativt organisationsklimat, och endast i det korta perspektivet. Faktorer som även på längre sikt hade betydelse för implementeringsresultatet var personalens förväntningar, att innovationen uppfattades ha fördelar, och att det nya arbetssättet upplevdes kompatibelt, d.v.s. stämde överens med hur man arbetat tidigare. Där större organisationsförändringar sammanföll med implementeringen påverkades utfallet negativt. Värderingar, åsikter och beteenden knutna till de professionella subkulturer som förekommer inom hälso- och sjukvården, tycks ha påverkat hur personal inom de olika yrkesgrupperna upplevde implementeringsprocessen.

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APPENDIX A: BASELINE QUESTIONNAIRE

ssion:								
General practitioner								
Nurse								
Assistant nurse								
Other profession								
or of wo	arc in nr	focci	on:					
-				\circ	>10			
) - 2	3–3	0	6-10	O	>10			
Female	0		Male					
of birth _			_					
ninion is	that at t	his ur	nit discu	ssino l	lifestyle issues with natient ha	as high priority		
9			iit, aisca	.551116	Partly disagree	Disagree		
nimian ia	that the		aron at th	iamit	is positive to staff disquesing	lifootylo issues with notionts		
			ger at tn	is unit				
:	Partiy aş	gree			Partiy disagree	Disagree		
h care sta	aff has a	respo	nsibility	to ask	patients about lifestyle issues	5		
2	Partly ag	gree			Partly disagree	Disagree		
n to the	natient to	tako	resnone	ihility	for his or her lifestyle			
P to the	rancin ic	, take	respons	Luity	ioi ino oi inci mesty ic			
	General p Nurse Assistant Other proper of ye Der of ye Demale Of birth _ Doinion is Doinion is	General practition Nurse Assistant nurse Other profession per of years in pro 0-2	General practitioner Nurse Assistant nurse Other profession Deer of years in profession Deer of years	General practitioner Nurse Assistant nurse Other profession per of years in profession: 0-2	General practitioner Nurse Assistant nurse Other profession per of years in profession: 0-2	General practitioner Nurse Assistant nurse Other profession per of years in profession: 0-2 0 3-5 0 6-10 0 >10 Gemale 0 Male of birth pinion is that, at this unit, discussing lifestyle issues with patient has a Partly agree Partly disagree pinion is that the manager at this unit is positive to staff discussing a Partly disagree on care staff has a responsibility to ask patients about lifestyle issues		

In this electronic version, the instrument *Creative Climate Questionnaire* (CCQ) is omitted due to copyright issues.

APPENDIX B: NINE-MONTH FOLLOW-UP QUESTIONNAIRE

1. Profession:○ General practitioner	O Nurse	O Assistant nurse	Other profession
2. Number of years in profes 0 0-2 0 3-5 0	sion: 6–10 O	>10	
3. I am ○ Female ○ Male			
4. Year of birth			
5a. How often, since beginning the computer?	ng to use the co	omputer-based lifestyle test, h	nave you referred a patient to
Daily Once a week		Once a month	Never
5b. Since beginning to use the patients have you referred to >10% 10% 20% 30% 40%	the computer		ly what percentage of your
 5c. Why have you not referred It is not my job It does not fit into my red I forget Lack of time Other 	•	he computer-based lifestyle te	st?
5d. How do you use the resultest in meetings with your particles of the results and of the results are results.	atients? ne patient bring	gs it up	y the computer-based lifestyle
lifestyle test with patients?	t when I refer	ne lifestyle assessment provid the patient to the computer	ed by the computer-based
5f. Of the patients you have a percentage have you discuss >10% 10% 20% 30% 40	ed the results v		approximately what

lifestyle tes It has I forge No tin I feel u	t at appointments with not been relevant t	h your patients?	ent provided by the computer-based
test was int Much Somev Just as Somev Much	roduced, compared w more often now what more often now often what more often previ more often previously	ously	tients since the computer-based lifestyle
	C)
Agree	n discuss the compute Partly agree	er-based lifestyle test Partly disagree	Disagree
8. It feels go Agree	ood/would feel good t Partly agree	o refer patients to the compu Partly disagree	iter-based lifestyle test Disagree
9. Using the Agree	e computer-based lifes Partly agree	style test is well supported at Partly disagree	mongst staff Disagree
10. It is my based lifest Agree		ssible to influence patients' l Partly disagree	ifestyles with the aid of the computer-
11. I have fo	elt involved in the pro Partly agree	cess of introducing the comp Partly disagree	outer-based lifestyle test at the centre Disagree
12. I feel I c	an stand by the advice Partly agree	e provided by the computer- Partly disagree Di	based lifestyle test sagree Did not read the advice
13. It is my Agree	opinion that this healt Partly agree	th care centre prioritizes disc Partly disagree	russing lifestyle issues with patients Disagree
14. My opir patients Agree	nion is that the manag Partly agree	er at this unit is positive to st Partly disagree	taff discussing lifestyle issues with Disagree
0	- may agree	rain, anagree	21006100

APPENDIX C: 24-MONTH FOLLOW-UP QUESTIONNAIRE

1. Profession: General practitioner Nurse Assistant nurse Other profession	
2. Number of years in profession: ○ 0–2 ○ 3–5 ○ 6–10 ○ >10 3. I am ○ Female ○ Male	
4. Year of birth	
5. Health care staff have a responsibility to ask patients ab Agree Partly agree Partly disagree	out lifestyle issues Disagree
6. It is up to the patient to take responsibility for his or her Agree Partly agree Partly disagree	lifestyle Disagree
7. My opinion is that, at this unit, discussing lifestyle issue Agree Partly agree Partly disagree	es with patient has high priority Disagree
8. My opinion is that the manager at this unit is positionts	tive to staff discussing lifestyle issues with
Agree Partly agree Partly disagree	Disagree
9. There is a strong association between lifestyle habits and Agree Partly agree Partly disagree	d health Disagree
10. What proportion of your patients do you discuss lifest >10% 10% 20% 30% 40% 50% 60% 70% 80%	
In this part of the questionnaire we want to know how tool	you have used the computer-based lifestyle
11a. How often have you referred a patient to the compute Daily Once a week Once a month	
11b. Approximately what proportion of your patients d tool?	o you refer to the computer-based lifestyle
>10% 10% 20% 30% 40% 50% 60% 70% 80%	90% <90%

11c. What is the main reason for you not referring patients to the computer-based lifestyle tool? It is not my job It does not fit into my routines I have other routines to address lifestyle issues I do not believe in the idea I forget Lack of time Other
 11d. How do you use the results from the lifestyle assessment provided by the computer-based lifestyle tool in meetings with your patients? I do not use the results I discuss the results if the patient brings it up I ask for the results and try to start a discussion
 11e. When do you discuss the results from the lifestyle assessment provided by the computer-based lifestyle tool with patients? O During the appointment when I refer the patient to the test O At the next appointment O Other time
11f. Of the patients you have referred to the computer-based lifestyle tool, approximately what percentage have you discussed the lifestyle assessment results with? >10% 10% 20% 30% 40% 50% 60% 70% 80% 90% <90%
11g. What is the main reason why you have not used the results of the lifestyle assessment provided by the computer-based lifestyle tool at appointments with your patients? It has not been relevant If orget No time I feel uncomfortable I do not have enough knowledge Other
12. How often have you brought up lifestyle questions with patients since the computer-based lifestyle tool was introduced, compared with before its introduction? Much more often now Somewhat more often now Just as often Somewhat more often previously Much more often previously
13. Approximately what proportion of the patients you meet do you believe could benefit from performing the lifestyle assessment provided by the computer-based lifestyle tool? >10% 20% 30% 40% 50% 60% 70% 80% 90% <90%

In the following there are a number of statements that we ask you to give our opinion about:

14. Staff often discuss the computer-based lifestyle tool

Agree Partly agree Partly disagree Disagree

15. Using the computer-based lifestyle tool is well supported amongst staff

Agree Partly agree Partly disagree Disagree

16. The computer-based lifestyle tool facilitates work with lifestyle issues at the unit

gree Partly agree Partly disagree Disagree

17. The computer-based lifestyle tool facilitates my work with lifestyle issues

Agree Partly agree Partly disagree Disagree

18. The computer-based lifestyle tool is today an important part of working with lifestyle issues at our

PHC unit

Agree Partly agree Partly disagree Disagree

19. It feels good/would feel good to refer patients to the computer-based lifestyle tool

Agree Partly agree Partly disagree Disagree

20. It is my judgment that it is possible to influence patients' lifestyles with the aid of the computer-

based lifestyle tool

Agree Partly agree Partly disagree Disagree

21. I see no need for the computer-based lifestyle tool

Agree Partly agree Partly disagree Disagree

22. I usually read the feedback regarding the lifestyle assessment provided by the research team

Agree Partly agree Partly disagree Disagree

23. I feel I can represent the advice provided by the computer-based lifestyle tool

Agree Partly agree Partly disagree Disagree Did not read the advice

APPENDIX D: INTERVIEW GUIDE FOR FOCUS GROUPS

Opening question

How has your working situation been for the last six months? Staff?
Activities?
Organizational change?

Key questions:

How did you find out that the computer-based lifestyle intervention tool (CLT) was to be introduced at your work place?

Was the information provided 'as usual'? *If not – what was the difference?*

Could you influence the decision?

What are your perceptions of the implementation process?

How have you used the CLT? *Barriers? Possibilities?*

How has the CLT been used by members from different staff categories?

What is the perception of addressing lifestyle issues in different staff categories?

Has the CLT influenced work with lifestyle issues? *If yes – how? Is there a difference between the different staff categories?*

What are the attitudes to change among staff at this PHC unit? *Differences between the staff categories?*

APPENDIX E: INTERVIEW GUIDE FOR MANAGERS

Opening question:

How has your working situation been for the last six months? Staff?
Activities?
Organizational change?

Key questions:

What is your opinion about working with health promotion?

What is the general opinion about working with health promotion at your PHC unit? *Differences between staff categories?*

How has it worked to use the computer-based lifestyle intervention tool (CLT)? Differences between staff categories? Obstacles? Possibilities?

Have your ways of addressing lifestyle issues changed since you started to use the CLT? What was it like before?

Differences between staff categories?

What is your opinion about the implementation process?

What is your experience of implementing other innovations? *Similarities, differences, preferences.*

What are the attitudes to change at your PHC unit? *New working methods, new routines, new knowledge.*