UNIVERSITETET I AGDER

Using the intervention mapping approach to develop a family-based childhood weight-management program

The FRISKUS project.

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Masteroppgaven er gjennomført som ledd i utdanningen ved Universitetet i Agder og er godkjent som del av denne utdanningen. Denne godkjenningen innebærer ikke at universitetet innestår for de metoder som er anvendt og de konklusjoner som er trukket.

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I would never have been able to complete these five years as a combined mother and student without my patient and loving husband. Thank you, Kim! I would also like to thank my parents, my sister and my parents in law for always supporting and helping me out by babysitting. Thanks to my wonderful children Aurora, Andreas and August for holding out and for reminding me of what is most important in life!

Sammendrag

WHO klassifiserer fedme som en av de største truslene mot folkehelsa i vår tid. Forskning viser at 17 % av 6-11-åringer er overvektige eller fete. Barn med fedme er i risikogruppen for å utvikle blant annet hjerte- og kar sykdommer og diabetes type 2. Målet med denne oppgaven er, ved hjelp av intervention mapping (IM) som verktøy, systematisk å beskrive utviklingen av en familiebasert livsstilsintervensjon (FRISKUS) rettet mot overvektige barn mellom 6 og 10 år og som skal implementeres i kommunehelsetjenesten i Kristiansand..
Intervention mapping (IM) er et verktøy som bidrar til teoretisk og empirisk forankring, og er blitt brukt som et rammeverk for å utvikle et skreddersydd familie-basert vekt-stabiliserings program. Som en del av IM ble det gjennomført semi-strukturerte individuelle intervjuer med foreldre til overvektige og fete barn samt fokusgruppe intervju med helsesøstre. I tillegg ble det søkt i litteraturen etter determinanter for helse-relatert adferd og effektive intervensjoner.
Jeg vil først i oppgaven beskrive bakgrunn for tema, for så å gjøre rede for prevalens, årsaker til og konsekvenser av overvekt og fedme blant barn. Så vil jeg presentere det teoretiske fundament før jeg beskriver metoden som er brukt. Resultater presenteres kort før omslaget avsluttes med en konklusjon. Arbeidet har resultert i en artikkel som systematisk beskriver prosessen i å utvikle en familierettet intervensjon med fokus på å sikre en sunnere livsstil for å stabilisere vekten blant overvektige barn.

Nøkkelord: Intervention mapping, barn, overvekt, behandling, familie-basert, fysisk aktivitet, kosthold

Abstract

WHO classify obesity as one of the greatest public health challenges of the 21st century. In Norway 17% of the children aged 6-11 years are overweight or obese. This is of major concern, because childhood obesity is strongly associated with risk factors as cardiovascular disease and type 2 diabetes.

The aim of this master thesis is to describe the systematic development of an intervention program, FRISKUS, to be used in the municipalities to improve lifestyle habits among overweight children, aged 6-10 years old. The Intervention mapping protocol (IM) was used as a framework for effective decision making. IM is based on the importance of developing-theory-and evidence-informed programs, taking an ecological approach to assessing and intervening in health-problems. As a part of the IM process, semi-structured interviews with parents and focus-group interviews with school nurses were conducted. In addition, the literature were searched for empirical evidence and related theories.

Firstly in this paper the background for the selected topic is described. Furthermore, I will present the prevalence, causes and consequences of childhood overweight and obesity. The theoretical fundament and the method Intervention mapping will be described. Finally, results, discussion and conclusion will be presented. This paper has resulted in an article which describes the systematic development of a family-based childhood weight management program.

Keywords: Intervention mapping, children, overweight, treatment, family-centered, physical activity, diet.

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1.0 Introduction

1.1Background

WHO classify obesity as one of the greatest public health challenges of the 21st century [1]. Several studies have shown an increasing prevalence of overweight and obesity among European children during the last decades [2]. This is of major concern as childhood obesity is strongly associated with risk factors for cardiovascular disease type 2 diabetes. In addition, childhood obesity is associated with mental disorders, orthopedic problems and lower self-esteem [3, 4].

Reforms in the Norwegian health care system places more responsibility on the municipal health care institution, and aim to focus on prevention and early intervention [5]. In order to screen for overweight and obesity in children, guidelines for measuring height and weight have been provided to school nurses [6]. This new area of responsibility has been a subject of debate among school nurses, partly because of the lack of programs to assist overweight /obese children and their families in making healthy lifestyle changes. Thus, there is a need for programs in the municipalities to provide to these children and their families.

1.2 The purpose of the thesis

The purpose of this thesis is to describe the systematic development of a family-based weight management program, FRISKUS that aims to improve lifestyle habits among overweight children, aged 6-10 years old, in Norway.

2.0 Overweight and obesity in children

2.1 Prevalence

The prevalence of childhood overweight and obesity in Europe has increased dramatically during the past decades [2, 7]. According to WHO, about 20 % of European children and adolescents are overweight, and one third of these are obese [2]. Although the prevalence of childhood obesity seems to have hit a plateau in some European countries, including Norway, the prevalence is still high [7, 8]. A study by Juliussen and co-workers [9] reported that 17 % of Norwegian children, aged 6-11 years old, were overweight or obese, and studies have reported the highest prevalence of among those with low socioeconomic status [10, 11].

2.2 Risk behaviors and environmental factors related to childhood overweight and obesity

The causes of childhood overweight and obesity are complex and not one way causal. As most factors related to childhood overweight and obesity does not work in isolation, targeting solely one factor may not have a significant impact on the growing problem. In addition to physiological, biological, psychosocial and medical factors, there is growing evidence that socio-economic factors may contribute to the development of overweight and obesity [10-12]. The following factors have been identified as risk factors of childhood overweight.

2.2.1 Physical inactivity

High levels of physical activity in early childhood have been associated with a low risk of being overweight and obese [13]. Increased physical activity during childhood may also lead to improved physical competence and fitness, which is a contributing factor for maintaining active throughout adolescence and adulthood [1]. The current physical activity guidelines for children recommend that children are moderately -to vigorously active at least 6o min per day [14]. A report from the Norwegian Directorate of Health showed that most children at 6 years old achieved the recommended daily physical activity goal (87 % of the girls and 95, 7 % of the boys) [15]. Among the 9-years old, 69, 8 % of the girls and 86, 2% of the boys met

these recommendations, whereas only 43, 2 % of the girls and 58, 1 % of the boys at age 15, engaged in physical activities according to the recommendations [15].

2.2.2 Sedentary behavior

The Norwegian Directorate of Health have reported that Norwegian 9- and 15 years old spent more time on sedentary behavior in 2011 compared to 2005/2006 [15]. Several studies have shown that screen-based sedentary behavior has been associated with childhood obesity [16, 17]. Investigators have hypothesized that television viewing is associated with increased risk of obesity due to one or more of the following three mechanisms: (1) displacement of physical activity, (2) increased calorie consumption while watching or caused by the effects of advertising, and (3) reduced resting metabolism [18]. Reducing access to screen-based sedentary activities has shown to be an important factor for effective weight loss in obese children [18, 19]. Further, Healy and co-workers [20] have shown the importance of avoiding prolonged uninterrupted periods of sedentary time.

2.2.3 Energy dense foods and beverages

Intake of energy dense food and beverages, especially sugar-sweetened beverages, seems to be main factors contributing to the development of overweight and obesity in children [21-24]. Oellingrath and co-workers [41] found that a diet characterized by high-fat and high-sugar processed fast foods was associated with overweight. The lowest prevalence of overweight was found among children with a diet based on low-fat and low-sugar products. Reducing the energy density of multiple meals decreases the energy intake [25]. On the other hand, intake of low energy-dense foods, including fruit and vegetables, might prevent childhood overweight and obesity [22, 25, 26].

2.2.4 Irregular meal pattern

A Cross –sectional study among children have reported an association between overweight and eating in front of TV, eating without supervision and skipping breakfast [23, 27, 28]. It has been postulated that eating supper while watching television or without family supervision has been associated with childhood obesity [23,28]. Another study has shown that frequent consumption of takeaways for dinner and irregular meals were associated with overweight among children [21]. I Another Norwegian study has reported that eating four meals/day was significantly negatively related to overweight among Norwegian children, also when controlled for potential confounding factors [29].

2.2.5 Insufficiant sleep

Short sleep duration during childhood is an independent risk factor for childhood obesity [30, 31]. A recent published study reported that late bedtimes and late wake up times are associated with poorer diet quality, independent of sleep duration, physical activity level and child and socio-demographic characteristics [32].

2.2.6 Environmental factors

It is suggested that the reported increase in overweight and obesity might be a result of an interaction between environmental and hereditary factors in the way that several genetic variants interact with "at-risk" environment [33]. Behavior change interventions cannot operate in isolation from the context and the interplay between the obsogenic environment and the child. Environmental factors such as family, kindergarten, school and local community may contribute to the complex context in which children develop overweight and obesity (figure 2). Family-centered interventions emphasize intra-familial and contextual factors that define and govern daily life and family decision making [34]. A Norwegian study identified that overweight among the children was positively associated with paternal and maternal overweight, and inversely associated with maternal education and physical activity level [41]. The latter mentioned study also showed a higher prevalence of overweight and obesity in children whose mothers receiving unemployment benefit [41]. Fismen and co-workers [11] found that norms, values, health consciousness and habits attached to cultural capital were important predictors of healthy food choices among adolescents.

Parents play a fundamental role in shaping children`s development, including their dietary and physical activity behaviors [35]. Thus, it is important that parents play a central role in the intervention. Changing parental behavior by improving parental skills (i.e. limit setting, parental leadership praise, support and structuring) seems to be an important focus in order to improve eating- and physical activity habits of their children [35-37]. Interventions that include a parent training component have been effective in treatment of childhood obesity [35, 38, 39]. There is still a lack of knowledge about factors that are associated with parent's ability to positively affect health related behaviors of their children. Arredondo and co-workers [37] suggested that interventions focusing on improving healthy eating habits and

increasing physical activity levels should encourage parents to monitor their children's health behaviors and learn to use positive reinforcement to evoke this positive behavioral change from the child. Psychological stress in the family may also be a contributing factor for childhood obesity [40]. Interaction and quality time with parents is believed to reduce stress in children [42]. These findings underline the importance of providing psychological and social support to overweight/obese children and their families [42].

2.3 Consequences of childhood overweight and obesity

A large number of studies have demonstrated the persistence of childhood overweight and obesity into adulthood increasing their risk of disease and disability later in life [43-45]. In addition to the increased risk of physical disabilities and psychological problems, excess weight drastically increases a person's risk of developing a number of non-communicable diseases including cardiovascular disease, cancer and diabetes (figure 1).

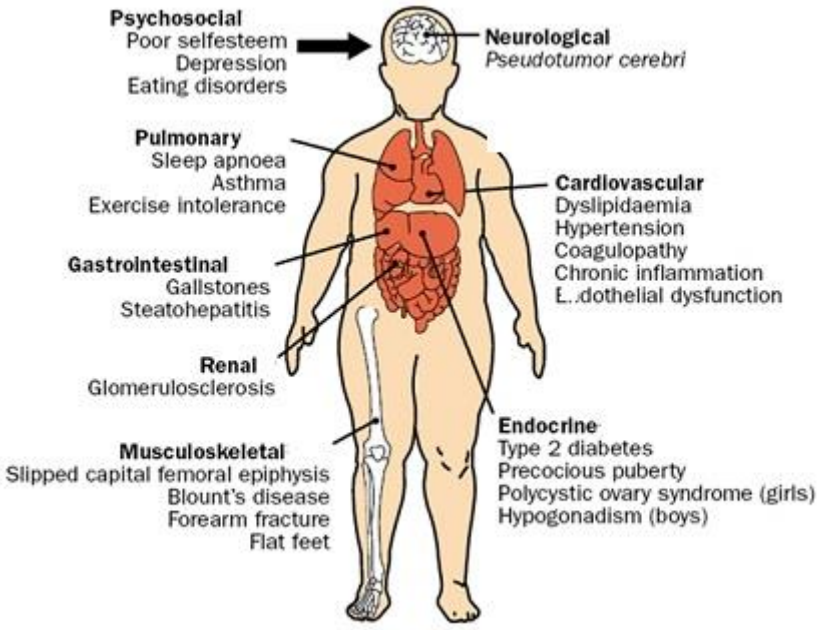

Figure 1: Consequences of childhood obesity, from Ebbeling [3].

2.4 Prevention and treatment

WHO's recommendations for preventing and managing obesity emphasize the need for early prevention to ensure lifelong healthy eating and physical activity patterns [12].

The long-time effectiveness of weight-loss interventions in child is not well studied [46, 47]. Most of the studies focusing on health-behavior change have reported only short-term effects, and the results from these studies are based on relatively few study participants (47). Thus, more information is needed in order to identify the best way to prevent and treat overweight and obesity in children [46]. A comprehensive Cochrane review [47] reported that overweight /obese children and adolescents may reduce weight 6 and 12 months after initiating healthy lifestyle programs focusing on changes in dietary- and physical activity habits. A Norwegian study targeting psychosocial risk factors, physical activity and diet among obese children reported a moderate but significant reduction in BMI and body fat after six months and two year follow-up after an intervention period [38].

Another Norwegian study investigated the feasibility and impact on BMI and physical fitness of a 40- week structured physical activity intervention for obese and inactive children, carried out in primary health care system [48]. Cardiovascular capacity and physical fitness increased and BMI decreased in those who completed. However, the dropout rate was substantial and depended on the attendance and compliance with physical activity by the parents [48]. Berntsen and co-workers [49] found that five months of guided active play was associated with increased physical activity levels during weekend days and reduced body fat, although weakly, in overweight and obese children and adolescents participating in multi-disciplinary weight reduction programs.

A review describing psychological interventions in the treatment of childhood obesity, suggested that a number of interventions may be effective, including multi-component family-based behavioral interventions, interventions aimed at reducing sedentary behavior and/or increasing physical activity levels as a component of family-based behavioral treatments [50]. Nowicka and co-workers [51] found that low-intensity solution-focused family therapy intervention could be useful in a clinical setting to treat obese children. However, Steinsbekk [38] suggest that a more intensive family-based intervention focusing on behavioral treatment, physical activity and diet may be even more effective.

The MEND-program (UK), a multicomponent community-based childhood obesity intervention, studied 116 obese children [52]. They were randomly assigned to intervention or waiting list control (6-month delayed intervention). Parents and children attended eighteen 2-h group educational and physical activity sessions twice a week, followed by a 12-week free family swimming pass. Waist circumference, BMI, body composition, sedentary activities, physical activity level, cardiovascular fitness and self-esteem were assessed at baseline and at 6 months. After 12 months, participants in the intervention group had a significant reduced waist circumference and BMI at 6 months when compared to the controls. Significance between-group differences were also observed in cardiovascular fitness, physical activity, sedentary behaviors, and self-esteem. At 12 months, children in the intervention group had reduced their waist and BMI and benefits in cardiovascular fitness, physical activity levels, and self-esteem were sustained [52].

Danielsson and co-workers [53] investigated whether the degree of obesity predicted the efficacy of long-term behavioral treatment in a 3-year longitudinal observational study in children aged 6-16 years (n=643). They also explored the interaction with age. Among the youngest moderately obese children, 44% had a clinically significant reduction in BMI-SD score. Twenty percent of children who were 10 to 13 years of age and 8% of children who were 14 to 16 years of age had a reduction in BMI-SD score of 0.5 units or more. 58%of the severely obese young children showed a clinically significant reduction in BMI-SD score .The severely obese adolescents showed no change in mean BMI-SD score after 3 years. The results show that the degree of obesity was an important predictor of treatment outcome and that treatment outcome varied by age. Sabin and co-workers supports these findings, as age was found to be the most important predictor of weight loss in children [54].

Fassihi and co-workers [55] have studied which factors predict unsuccessful outcome in a weight management intervention for obese children. They found that children from families where both parents reported having a weight problem were six times more likely to be unsuccessful compared to children from families where neither parent reported weight problems. Therefore, it is important to tailor the intervention to those families who are less likely to be successful. Supporting overweight parents to make their own successful lifestyle changes may be one way of improving the child's likelihood of weight loss [55].

3.0 Theoretical framework of the present intervention program

There are many theories aiming to explain why individuals behave like they do. Many of the theories have been helpful in developing health-promoting interventions [56].

3.1 The family system perspective

The development of childhood overweight and obesity involves a complex set of factors from multiple contexts. The social-ecological model developed by Bronfenbrenner [57] and adapted by Kazak [58] are examples of family systems perspectives on childhood overweight. These complex set of factors interact with each other to place a child at risk of overweight. The model suggest that a child's physical activity as well as his/her diet and eating behaviors would be a product of the child's dispositions and developmental level, interaction with the parents and friends, and being related to larger systems such as food-advertising and politics. Figure 2 presents a model of the development of childhood obesity based on the results of research assessing predictors of childhood overweight in combination with ecological systems theory [59].

The socio-ecological model is used to gain an understanding of the development of obesity in children, but it can also be applied to the treatment of obesity. Treatment of obesity focuses mainly on child- and parent variables, more specifically on changing their diet and physical activity behavior. Predictors associated with development of obesity are not equal to those predicting changes in diet- and physical activity during treatment, therefore additional variables must be added.

Factors predicting health behavior change can be found within the health behavior models. Health behavior is defined as behavior undertaken by individuals to enhance or maintain their health [56]. Several models have been developed in an attempt to describe why individuals do or do not engage in particular health behaviors and how to change these behaviors. The models are used both as a framework for designing interventions and for understanding how interventions work to promote change in diet and physical activity [56, 60].

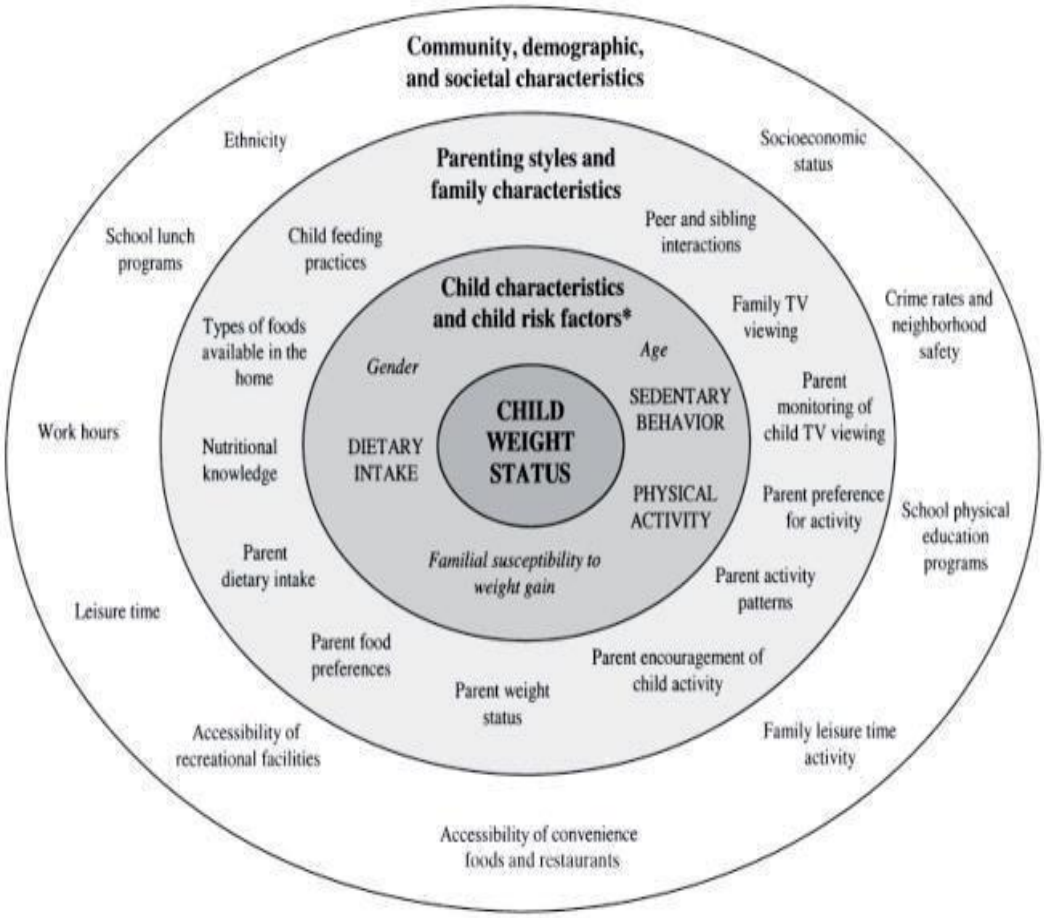

Figure 2: Ecological model of predictors of childhood overweight. Child risk factors refer to child's behaviors associated with the development of overweight (Shown in upper case letters). Characteristics of the child (shown in italic letters) interact with contextual factors and child risk factors to influence the development of overweight [59].

3.2 The Social Cognitive Theory

Social cognitive theory (SCT) is an interpersonal theory that covers both determinants of the behavior and the process of behavior change [61]. SCT is the most frequently used paradigm in weight management interventions [56]. SCT describes a person's behavior as a model of reciprocal determinism. Both behavior and environmental factors operate as interacting determinants of each other. The theory specifies a set of determinants and the mechanisms though which they work in order to affect health behavior [62]. Determinants of behavior described in SCT are self-efficacy, outcome expectation, outcome expectancies, environment, perceived behavior of others and behavioral capability. Self-efficacy refers to the individual's belief in his or her ability to perform and succeed in specific situations or activities, the individual's confidence that he/she is able to change his/her behavior [62]. People with greater levels of self-efficacy will be more likely to engage in a specific behavior (i.e. exercising) persist until they manage it, and maintain the behavior. The construct of self-efficacy has been among the most analyzed psychosocial constructs in both nutrition and physical activity studies [56]. Self-efficacy expectations develop and are modifiable through four sources of experiential information; performance accomplishments, vicarious learning or modeling, degree of emotional arousal (diminishing negative affect such as anxiety) and verbal persuasion or encouragement from others to engage in a specific behavior. In treatment of obesity, setting realistic goals when aiming at changing health behavior (i.e. increased intake of fruit) can increase the individuals' sense of self-efficacy through performance accomplishments and thereby increase the likelihood of changing health behavior. Positive associations between self-efficacy and weight-loss have been shown ([56, 63].

3.3 Self-Determination Theory

Self-determination theory (SDT) is a theory of human motivation, concerning people's inherent growth tendencies and their innate psychological needs [64, 65]. It is concerned with the motivation behind the choices people make. SDT focuses on the degree to which an individual's behavior is self-motivated and self-determined. SDT suggest that *intrinsic motivation* is the inherent propensity to actively develop skills, engage challenges and take interest in new activities even in the absence of rewards and external prompts. Intrinsic motivation refers to doing the activity "for its own sake", and the rewards is within the activity itself [65].

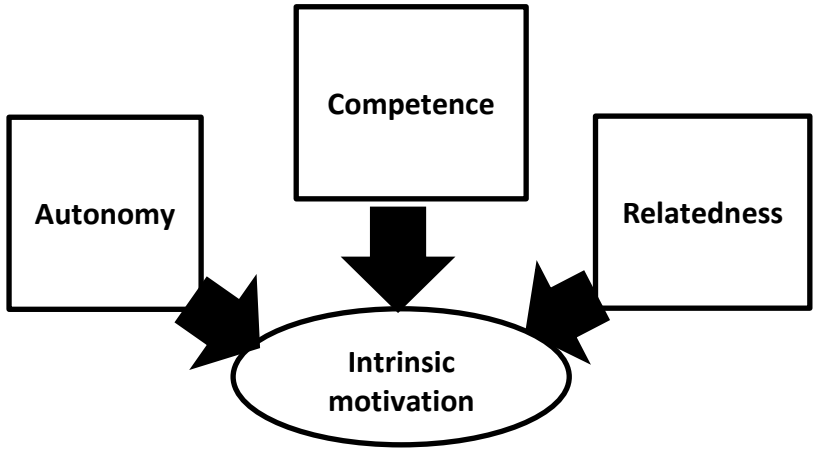

Figure 3: Intrinsic motivation is determined by three sub-conditions; Autonomy, competence and relatedness [64].

Autonomy, competence and relatedness

Intrinsic motivation is determined by three sub-conditions (figure 3) [64, 65]. The first, Autonomy, refers to an individual's self-government. Most health-related behaviors, like increasing physical activity or to quit smoking are not intrinsically motivated. To be successfully enacted and maintained, individuals must come to value the behavior. Many people engage in behavior change only because of *controlled motivation*, i.e. *external regulation* –in which a person act only to comply with social pressure, avoid punishment or get an external reward. These forms of motivation are unrelated to long term adherence. By facilitating autonomy individuals are more likely to value a behavior and identify with it. Autonomy is associated with enhanced maintenance of behavior change [64].

In addition an individual's experience of competence and confidence are related to the intrinsic motivation. In the SDT model of change, gaining a sense of competence is facilitated by autonomy. In contradistinction to self-efficacy theory (Bandura), SDT predicts that competence must be accompanied by autonomy or volition to ensure adherence [65].The third sub-condition of intrinsic motivation is relatedness. In health-care, this especially concerns the relationship between practitioner and patient. Vulnerable individuals looking for input and guidance of professionals need to feel understood respected and cared for. This is essential to forming the experience of connection that allow for internalization to occur [65].There has been a number of field studies and randomized controlled trials of interventions based on the SDT approach to change [66, 67].

This multidimensional approach to the underpinnings of intrinsic motivation provides a more complete picture than other theories that emphasize just one necessary antecedent of intrinsic motivation. The subjective experience associated with intrinsic motivation, flow-, will occur when there is a balance between skills and opportunities for action. An optimal challenge that is not accompanied by feelings of autonomy will not prompt intrinsic motivation [65]. There are many reasons for engaging in sport or exercise. Within SDT there are two broad classes of non-intrinsic motivation [65]. The first is *extrinsic motivation*, which concerns all instrumental behaviors, and the second is *amotivation*- that concerns the various forms of not having either energy or intention toward action. Deci and Ryan developed *Organismic Integration Theory* (OIT), as a sub-theory of SDT, to explain the different ways in which extrinsically motivated behavior is regulated. This will not be described in this paper, but can be found elsewhere [64].

3.4 Theory of planned behavior

The theory of planned behavior (TPB) is an extension of Theory of reasoned action by Fishbein & Ajzen [68, 69]. It is the health behavior model most extensively used in research [56]. TPB can be used in situations which people are aware of the negative consequences of their behavior. TBP postulate that *intention* is the most important determinant of behavior. Intention is determined by three conceptually independent constructs; Attitude, subjective norms and perceived behavioral control (figure 4). In addition, actual behavioral control refers to the extent to which a person has the skills and resources needed to perform a given behavior [68, 70]. The influence of attitudes, subjective norms, and perceived behavioral control in the prediction of intention is expected to vary across behaviors and intentions. TPB describe attitude as a disposition to respond favorably or unfavorably to for example a behavior. The attitude toward the behavior is determined by salient beliefs about that behavior [68, 70]. Each behavioral belief links the behavior to a certain outcome or to an attribute. The construct of subjective norms (perceived social expectations) is the perceived social pressure to engage or not to engage in a behavior. It is assumed that subjective norm is determined by the total set of accessible normative beliefs concerning the expectations of important referents. Perceived behavioral control refers to an individual's perception of its ability to perform a given behavior. It is assumed that perceived behavioral control is determined by the total set of accessible control beliefs [68, 70].

Perceived behavioral control is believed to moderate the relationship between intention and behavior, i.e. intention will convert to behavior when perceived behavioral control is high. TPB has been shown to significantly predict weight-loss in adults [71]. TPB have been examined in population studies of children, but has not been applied in pediatric treatment studies as far as we know. Gable and Lutz [72, 73] found that parental attitudes towards mealtimes and nutrition influence children's health.

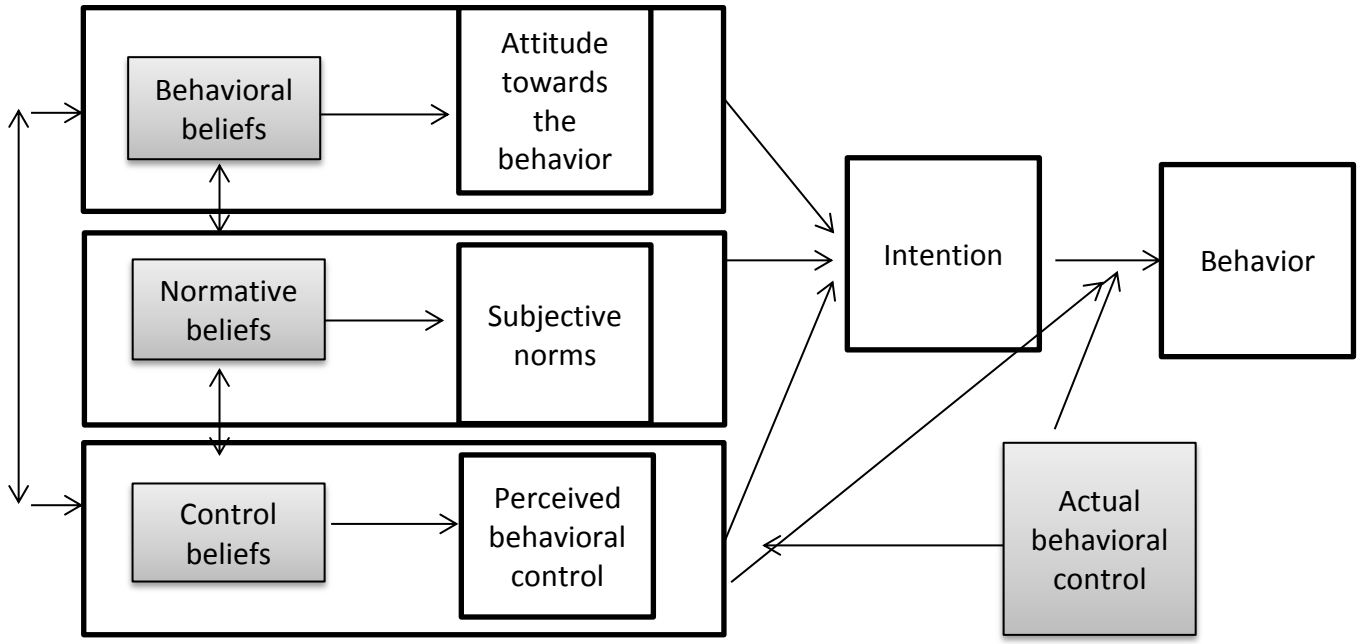

Figure 4: The TPB constructs and its determinants (in grey boxes), after Ajzen [70].

3.5 Theory of Self-regulation

Self-regulation is the self's capacity for altering its behaviors. It refers to the capacity of individuals to override and alter their responses. Changing one's behavior so as to follow rules, match ideals, or pursue goals is thus a very useful form of self-regulation [74]. Self-regulation emphasizes four main components. The first component is standards. Self-regulation requires a clear and well-defined standard. Ambiguous, inconsistent, uncertain or conflicting standards make self-regulation difficult. Goals serve as reference values for feedback processes. A feedback loop consists of four elements—an input function, a reference value, a comparator, and an output function [75]. Second, self-regulation requires monitoring of one's behavior. The third component is self-regulatory strength, so called willpower. Operations aimed at changing the self are difficult and therefore require some power. The fourth component is motivation – specifically, motivation to achieve the goal or meet the standard. Even if the standards are clear, monitoring is fully effective, and the person's resources are abundant, he or she may still fail to self-regulate due to not caring about reaching the goal. Thus, the proper way to understand the role of motivation in self- regulation is as one of four components where some of each is necessary for effective self-regulation [74].

4.0 Tools and methods for planning the present intervention program

Ethical approval was obtained from The Ethical Committee at the faculty of health and sports science at The University in Agder, Kristiansand.

The author provided written informed consent before conducting focus group- interview (appendix I) and Interviews (appendix II and III).

4.1 Intervention mapping

The literature previously called for a structured evidence-based development of intervention programs [58]. Intervention mapping (IM) is a framework for effective decision making. It is based on the importance of developing-theory-and evidence-informed programs, taking an ecological approach to assessing and intervening in health-problems [76]. IM describe the process for developing theory- and evidence based intervention programs and consists of six different steps: 1) The needs assessments, 2) The definition of proximal program objectives based on scientific analyses of health problems and problem causing factors, 3) The selection of theory-based intervention methods and practical strategies to change health related behaviors, 4) The production of program components, 5) The anticipation of program adoption, implementation and sustainability and 6) The anticipation of process and effect evaluation. It is an interactive process, and the planners can go back to the previous steps as they increase their knowledge about the health-problem and the determinants.

4.1.1 Core process for applying theory and evidence

The steps of IM are completed using core process including:

1. Posing planning problems as questions
2. “Brainstorming” answers to planning questions and using the current knowledge in the planning-group
3. Searching the literature for empirical evidence and evaluating the strength of the evidence
4. Accessing and using theory
5. Conducting new research for unanswered questions in the planning process
6. Developing the final summary of answers to the posed question [76].

4.1.2 Step 1: The needs assessment

In the first step, the discrepancy between the current situation and the desired situation in a given group is studied. The health problem is analyzed, and related risk behaviors and determinants are studied using the PRECEDE-framework (figure 5) [77]. This assessment encompasses two components: 1) an epidemiologic, behavioral, and social analysis of the at-risk group and its problem and 2) an effort to get to know and begin to understand the character of the members and the environment [76]. The product of this first step is a description of the health-problem and the behavioral and environmental causes and determinants. In this paper the needs assessment was focused on the target group of the project (children 6-10 years).

The following tasks are completed in step 1:

- A planning group is established. The group includes potential program participants and plans the needs assessment.
- The needs assessment is conducted using core processes and the PRECEDE-framework (figure 5)
- The needs assessment is balanced with an assessment of community capacity
- The needs assessment is linked to evaluation planning by establishing desired program outcomes [76].

4.1.2.1 Focus-group interview and semi-structured interview

As a part of the needs assessments in step 1, a qualitative study with the aim to explore the views of the key stakeholders involved in FRISKUS, a community-based child weight management program for children with overweight were conducted

Focus-group interview were conducted among school nurses in order to explore the challenges and barriers they meet when working with overweigh/obese children and their families. 5 school nurses were recruited from the local health care system. They were all experienced school nurses, some also worked in the child well clinic.

In addition, an individual interview was conducted with one of the leading nurses in order to identify whether there was an equal understanding of the problem and the challenges related to the school-nurses working with overweight children and their family. Focus group interview and interview with leading nurse followed a topic guide (appendix IV and V), including questions related to school nurses views of program content and delivery, and the impact the program had on the families they worked with. Focus group interviews were recorded and transcribed verbatim.

In addition, semi-structured interviews were conducted with 8 parents. This was mainly a mapping conversation for participating in the FRISKUS intervention program conducted by the health professionals related to the intervention). Interviews ranged in length up to 120 minutes. The interviews were conducted by health professionals with knowledge in cognitive therapy. One was interviewing the parents and the other one was taking notes. A topic guide was devised for the study drawn from the literature and evaluated in the planning group by the nutritionists and others with relevant competence. The guide included questions about the family situation, specific challenges, motivation and goalsetting (appendix VI).

4.1.2.2 Literature search

Data on prevalence, determinants and associations with overweight and obesity in children were retrieved up until March 2013 from the MedLine database, EBSCO, SCOPUS and PubMed combining prevalence, determinants, associations, children, overweight, obese. The literature-search also included searches for effective intervention in treating overweight and obesity in children. The same databases were used, combining different terms as interventions, treatment, obese, overweight, children, family-based, community-based and intervention mapping. In addition, the reference lists of the selected articles were screened for other relevant studies.

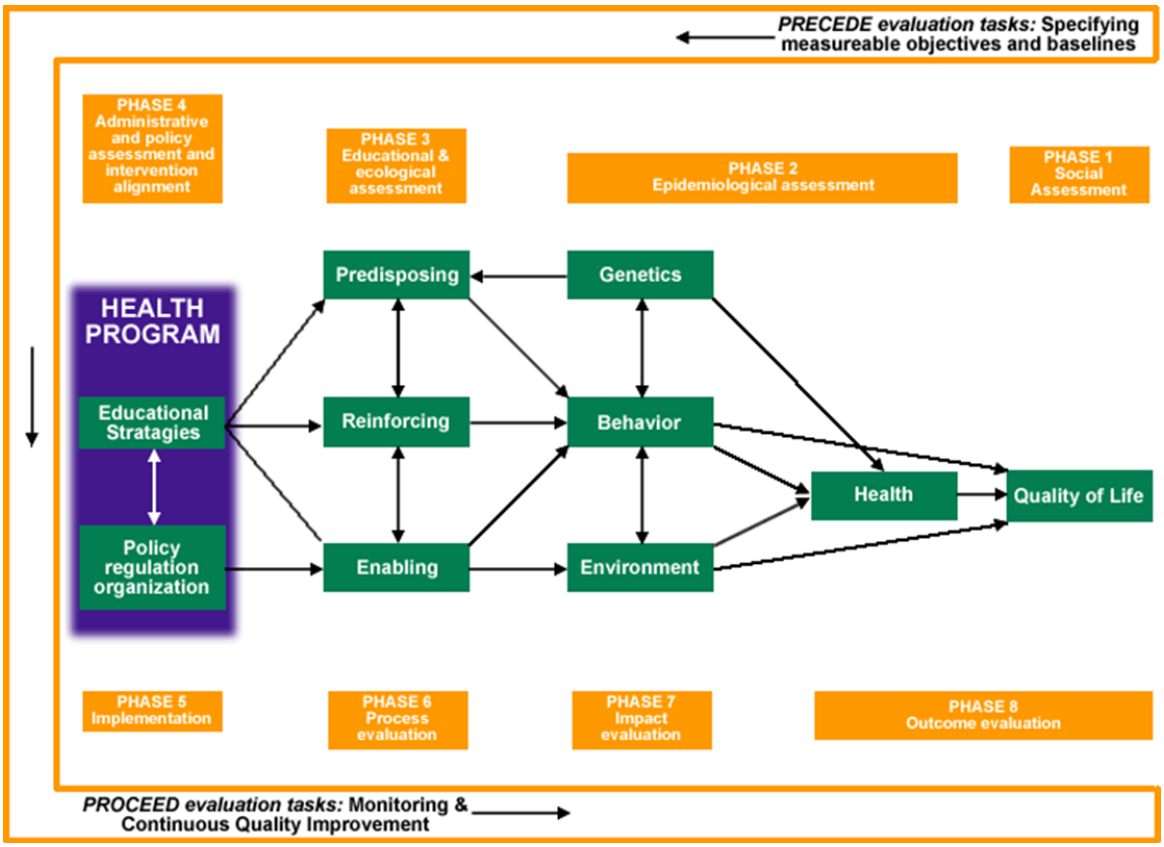

Figure 5: The PRECEDE-PROCEDE model by Green & Kreuter [77]

4.1.3 Step 2: The definition of proximal program objectives based on scientific analyses of health problems and problem causing factors

In the second step the foundation for the intervention is provided by specifying who and what will change as a result of the intervention. The product is a set of matrices of selected ecological levels (i.e. individual level, intrapersonal level and community level) that combines performance objectives for each level with selected personal and external determinants to produce change objectives, the most immediate target of an intervention.

The following tasks are completed in step 2:

- Expected change or program outcomes for health-related behavior and environmental conditions are stated
- Behavioral and environmental conditions are subdivided into performance objectives
- Important and changeable personal and external determinants of at-risk group behavior and environmental conditions are selected

- A matrix of change objectives are created for each level of intervention planning (i.e. individual, interpersonal, community) by crossing performance objectives with determinants [76].

4.1.4 Step 3: The selection of theory-based intervention methods and practical strategies to change (determinants of) health related behaviors

In this step appropriate theory-informed methods are selected for each specific change objective. The theoretical methods are then translated into practical strategies to be delivered in the intervention in order to modify the determinants of personal and environmental determinants.

An intervention method is a defined process by which theory postulates and empirical research provides evidence for how change may occur in the behavior of individuals, groups, or social structures. A strategy is a way of organizing and operationalizing the intervention methods.

The following tasks are completed in step 3:

- Program ideas are reviewed with the intended participants on order to get their perspectives when choosing methods and strategies
- Core processes are used to identify theoretical methods that can influence changes in determinants and identify the conditions under which a given method is most likely to be effective;
- Theoretical methods are chosen. It is important to ensure that all the program components contain methods, and be sure to distinguish between theoretical methods and practical strategies consider preliminary ideas in the program in light of information from theory and evidence.
- Practical strategies for delivering the methods to intervention groups are selected
- Assure that the final strategies match the change objectives from the matrices [76].

4.1.5 Step 4, 5 and 6

Step 4, 5 and 6 are not included in this paper, and will therefore only be briefly mentioned as more information about these steps can be found elsewhere [76].

In step 4 the scope and sequences of the components in the intervention, completed program materials, and program protocols are described and pretested.

The focus of Step 5 is program adoption, implementation and program sustainability and the product is a detailed plan for accomplishing program adoption and implementation by influencing behavior of individuals or groups who will make decisions about adopting and using the program. In Step 6, an evaluation plan is completed. Planning for evaluation begin in the needs assessment and is developed along with the intervention map [76].

5.0 Results

5.1 Step 1

The results of step 1 are the 6 program objectives:

1. Increasing daily physical activity levels to the recommended 60 min per day
2. Decreasing sedentary behavior
3: Increasing intake of fruit and vegetables to 5 portions per day
4. Increasing daily intake of water
5. Decreasing daily intake of energy dense food
6: Increasing the number of family meals

The program objectives were subdivided into performance objectives and important and changeable determinants were selected on both the individual (children) and interpersonal level (parents) (table 1).

Table 1: Selected determinants on individual and interpersonal level and the related theories

Determinants children	**Related theory**	**Determinants parents**	**Related theory**
Self-efficacy	Social Cognitive Theory	Attitudes / Knowledge	Theory of Planned Behavior
Outcome expectations	Social Cognitive Theory	Self-efficacy/ Skills	Social Cognitive Theory
Motivation	Self-Determination Theory	Outcome expectations	Social Cognitive Theory
Attitude	Theory of Planned Behavior	Social Support/ Perceived norms	Social Cognitive Theory/ Theory of Planned Behavior

5.2 Step 2

By crossing determinants with performance objective change objectives were formulated. The result of step 2 is the matrixes of proximal program objectives (Appendix VII and VIII).

5.3 Step 3

The results from step 3 are practical applications in the intervention. An overview of the main methods and strategies applied in the intervention and the theories from which they were derived are shown in table 2 and table 3.

Table 2: A selection of theoretical methods and practical strategies that will be used on the children in the FRISKUS intervention

Determinant	Technique/Method (theory)	Strategy
Self-efficacy (SCT)	Model/demonstrate the behavior(SCT)	Provide opportunities for the child and actively involve them
	Set graded tasks(SCT)	Obstacle course with various options at different levels ,
	Active learning(SCT)	
	Tailoring(TTM)	One to one instruction in group activity
	Individualization(TTM)	
Outcome-expectations(SCT)	Model/demonstrate the behavior(SCT)	Trainers demonstrate behavior
	Create supportive environment(SCT)	The trainers give positive feedback in plenum
	Facilitation (SCT)	Group rules
		The activity is at an adequate level
	Explore attitudes(TPB)	The presentation of Friskus is catchy
	Increased knowledge(TPB)	Trainers explain what happens in the body when being active /
		The "friskus-game
	Direct experience(TPB)	Group activities are at a level that the children experience as fun
		The "friskus-game
Motivation(SDT)	<u>Competence(SDT):</u>	
	Provide relevant inputs(TPB)	Increase knowledge in the trainers about physiology and motor skills so that they can create effective activity-sessions and give positive feedback
	Feedback and active learning(TSR)	
	Set tasks on a gradient of difficulty(SDT)	

	Increase autonomy(SDT); Using cooperative learning(TSD)	The children get to decide an activity Give the participants opportunities to lead
	Relatedness(SDT): Practioner-child relationship Create a supportive environment (SCT) Group cohesion/identity(SDT)	Composition of the trainers (i.e. young and adult, boy and woman) Create group-accessories, Cultural similarities Social happenings beside the activity
Attitude (TPB)	Knowledge/ behavioral beliefs(TPB)	Trainers highlight/create expectations of what the children can expect to do (i.e. participate In more games in leisure-time), Discuss and highlight successive stories from within the group
	Modeling(SCT) Set tasks on a gradient of difficulties(SCT) Reinforcement and facilitation(SCT)	Trainers provide and guides fun games and tasks at different levels Trainers provides feedback in plenum Trainers create a supportive environment

Note: SCT: The Social Cognitive Theory, TTM: Trans Theoretic Theory, SDT: Self-Determination Theory, SRT: Self-regulation Theory, TSD: Theory of Stigma and Discrimination, TOL: Theories of Learning, PCM: Persuasion-Communication Matrix, TIP: Theories of Information and processing

Table 3: A selection of theoretical methods and practical strategies that will be used on the parents in the FRISKUS intervention

Determinant	Technique/Method (theory)	Strategy
Attitude/Knowledge (TPB)	Arguments (PCM) Discussion (TIP) Elaboration (TIP)	Provide information about goal and contents/components included in "Friskus" Lesson in lifestyle-changes including discussions Community members tell their stories in the local newspaper or in a group-lesson Leaflets
	Cultural similarity(PCM)	Include only children/family in the same situation
	Monitoring(SRT)) Persuasive communication (SCT) Environmental reevaluation (TTM)	Individual consultation
Self-efficacy/skills (SCT)	Active learning(SCT)	Lesson in diet and lifestyle-changes Practical lesson in making healthy meals Recipe-book
	Cognitive therapy Motivational interviewing (TSR)	Individual consultation
Outcome expectations(SCT)	Knowledge(TPB) Arguments(PCM)	Lessons in diet and lifestyle changes Community members tell their stories in the local newspaper or in a group-session

	Cognitive therapy Motivational interviewing (TSR)	Individual consultations
Social support/perceived norms(SCT/TPB)	Knowledge(TPB) Arguments (PCM) Discussion (TIP)	Individual consultations Lessons in diet and lifestyle-changes
	Create a supporting environment(SCT) Parents share experiences(TPB)	Other family members have information about the need for and the goal of participating in Friskus, Parents participating in a network/group

Note: SCT: The Social Cognitive Theory, TTM: Trans Theoretic Theory, SDT: Self-Determination Theory, SRT: Self-regulation Theory, TSD: Theory of Stigma and Discrimination, TOL: Theories of Learning, PCM: Persuasion-Communication Matrix, TIP: Theories of Information and processing

The «FRISKUS» Intervention

Practical applications to address the change objectives are showed in table 4.

Table 4: A selection of Friskus program-materials

Strategy	Description	Determinants
Individual consultations	3-8 individual consultation with health care providers(motivational interview, cognitive therapy)	Knowledge/ Attitude Self-efficacy/ Skills Outcome expectations Social support/perceived norms
Group lessons	Lessons in diet and lifestyle changes	Knowledge/ Attitude Self-efficacy/ Skills Social support/perceived norms

Parent self-help group	Facilitate parents participating in a group(,i.e. by serving fruit in the waiting room, give them tasks, tell them to go for a walk together and discuss related topics. (when children on activity)	Social support/perceived norms
Activity-lesson for the children	Group-session in physical activity , preferably led by educated trainers from the local sports-club	Motivation(competence, relatedness, autonomy) Attitude
1 Advanced organizer in activity	Examples of easy games/activities to do at home/outside, and examples of trips at different levels in the local community	Knowledge
2 Advanced organizers in diet	5 healthy diet-advices(breakfast every day, table-model, 5 servings of fruit and vegetables, drink water, /example of 5 servings of fruits and vegetables Recipe dinner/dessert, breakfast	Knowledge
The FRISKUS hand-book	Spiral booklet containing information about healthy diet, recipes, activities, tips/advices	Knowledge Skills
The FRISKUS monitor	Table with sticker to help the children attain their goals	Motivation Attitude
The"FRISKUS-game"	A game that children can play with friends or parents which contains tasks in both physical activity and knowledge. Can be performed inside or outside.	Motivation Knowledge

Handbook for the health care providers (Not included in this paper)	Guiding the parents, Different forms, like monitoring, Advanced organizer in motivational interview	Knowledge Skills Self-efficacy
Social happenings	Twice a year, the parents and the children decide a social happening that the group can do together	Social support Motivation
"FRISKUS-Equipment	T-Shirt, drinking-bottle	Social support Motivation (relatedness)
Course in nutritional/diet knowledge (health care providers)	Theoretical course in nutrition and motivational interview	Knowledge Skills
Web-page	Information about the project, lifestyle changes and interactive utilities	Social support Motivation Knowledge Skills

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Using the intervention mapping approach to develop a family-based childhood weight-management program - The FRISKUS project.

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Background: The prevalence of childhood obesity has increased worldwide, and is now considered a public health problem. In Norway 17% of children aged 6-11 years are overweight or obese. The aim of this paper is to describe the systematic development of an intervention program, FRISKUS, to be used in the municipalities to improve lifestyle habits among overweight children, aged 6-10 years old, in Norway.

Method: The Intervention Mapping protocol (IM) was used to develop a tailored family-based weight-management program. IM is a structural six-step theory- and evidence based tool for development of health promotion programs, and this paper describes the first 3 steps of the protocol.

Results and conclusion: The FRISKUS project developed a community-based intervention program for the treatment of overweight in children using the intervention mapping protocol. The intervention can be implemented in a child-clinic/municipal setting. Although this intervention is developed based on theory and evidence, its effectiveness still needs to be evaluated in an evaluation study.

Keywords: Intervention mapping, children, overweight, treatment, family-centered, physical activity, diet

Background:

The prevalence of childhood overweight and obesity in Europe has increased dramatically during the past decades [1]**.** In Norway 17% of children aged 6-11 years are overweight or obese [2].

Recent reforms in the Norwegian health care system places more responsibility on municipal health care institutions with regard to prevention and early intervention in the course of a disease [3].Thus, an important focus is prevention of overweight and obesity among all age groups, including children [4]. In order to conduct school-based screening and monitoring of children´s body mass index (BMI), new guidelines on measuring children's heights and weights have been provided to school nurses [5]. As childhood obesity remains generally high, preventive efforts and early interventions among overweight/obese children are needed, however, few previously conducted programs have been successful in prevention of childhood obesity [6].

Obesity has a far-ranging negative effect on health. Substantial evidence supports the association between overweight and obesity and high blood glucose levels and abnormal blood lipid levels, which can lead to premature heart disease, stroke, cancer and diabetes [7, 8].Psychological consequences of obesity are also prominent as studies have shown significantly lower self-esteem among obese children compared to their non-obese peers [9].Associations between overweight and obesity with body image dissatisfaction, poorer self-assessed health status, potential social isolation and decreased life satisfaction have also been documented among youth [10]. Other health consequences of early onset of obesity are muscular-skeletal, orthopedic and neurological alignments [11, 12]. Although the prevalence of child obesity may be stabilizing in Norway and some other European countries, the prevalence is still high. Overweight and obesity is associated with socio-economic factors [13, 14]. Furthermore, several studies have demonstrated that overweight and obesity often persist into adulthood [15-17]. Thus, childhood obesity has both short term and long term impacts on health and well-being of individuals and yields a considerably financial cost to healthcare systems [18, 19]. However, the link between obesity and reduced health among children are not one way causal, but complex. Increased sedentary behavior and reduced daily activity in addition to unfavorable dietary habits resulting in positive increments in energy balance have been postulated as the main explanations for the

pediatric obesity epidemic [20]. Also increased screen-time has been associated with overweight in children [21]. An ecological approach suggests that the family context influence the child's health-related behavior [22]. Parents play a fundamental role in shaping children`s development, including their dietary and physical activity behaviors [23]. Family-centered interventions emphasize the importance of addressing intra-familial and contextual factors that define and govern daily life and family decision making [24]. However, few family-based studies focusing on preventing childhood obesity have yet been published, and those that do include a family component seldom focus on sustainable change in family practice [24]. National and International health organizations [4, 6] have called for a structured and systematic development of family-based intervention studies that aims to reduce overweight and to prevent childhood obesity.

In this process, an intervention mapping (IM) protocol [25] was used as a framework to ensure the development of a theory- and evidence-based health promotion program for the treatment of overweight in children aged 6-10 years.

Methods

This paper describes the three first steps in IM which involve 1) The needs assessments, 2) The definition of proximal program objectives based on scientific analyses of health problems and problem causing factors and 3) The selection of theory-based intervention methods and practical strategies to change health related behaviors.

Step 1: The needs assessment

In the first step a *planning group* of local professionals was formed, including program developer, physiotherapist, school-nurse, physician, scientists and key personal at different levels in the municipal organization. In addition, parents from the user-group were consulted during the process to ensure a user perspective.

Brainstorming and the Core-process for applying theory and evidence

The health problem was discussed and analyzed in the planning group using brainstorming, and then the literature were searched for empirical evidence and related theories. Related risk behaviors and determinants were studied using the PRECEDE- model framework [26]. Analysis of community capacity was assessed by the participants in the planning group and some external participants (leaders in the local sports-club and other key personal in the municipal organization).

This assessment encompasses two components: 1) an epidemiologic, behavioral, and social analysis of the at-risk group and its problem and 2) an effort to get to know and begin to understand the character of the members and the environment [75]. In this paper, the needs assessment identified the target group of the project to include overweight/ obese children between 6-10 years old, their parents and school nurses responsible for routine monitoring of the weight of young children. Further analyses identified risk behaviors and environmental factors that were related to childhood overweight and obesity. Then, important and changeable determinants were identified and selected. Furthermore, the literature reporting on effective interventions in treatment of childhood overweight and obesity was analyzed.

Focus-group interviews

In order to identify barriers and facilitators, and to explore the knowledge requirements, focus group interviews of local school-nurses (n=5) responsible for follow-up of overweight and obese children were conducted. School nurses from one urban district were invited to participate in the study. In addition, an individual interview was conducted with one of the leading nurses in order to identify if there was an equal understanding of the problem and the challenges related to the school-nurses work with children with overweight. The ethical approval for both the focus-group interview and the semi-structured interview was provided by the Ethical committee at the faculty of health and sports sciences at the University of Agder. The focus-group interviews were conducted by a trained research assistant at the local health clinics in January 2013. It followed a semi-structured interview-guide, and it was recorded and transcribed verbatim. Key findings of the focus-groups were identified through independent reviews of summary report, breaking the text into meaningful units and creating categories.

Individual interviews with parents

In order to ensure development of a tailored family-based weight-management program, eight parents of overweight or obese children provided information about self-experienced barriers facilitating a healthy lifestyle. The parents (n=8) were recruited from a pilot-study. A semi-structured interview guide with both open questions and scales was used as a tool, and the interviews were conducted in the child clinic by two health-care professionals. One of the health care professionals was responsible for conducting the interview, while the other one was observing and writing additional notes. The results were then analyzed by summarizing and categorizing the answers.

Step 2: Formulation of performance and change objectives

In this step, program objectives were stated and subdivided into performance objectives. The performance objectives are a defined set of sub behaviors that need to be accomplished in order to achieve the program objective. These performance objectives were formulated based on national guidelines and existing research. By crossing determinants with performance objective, specific change objectives were formulated for each level of intervention planning.

Step 3: The selection of theory-based intervention methods and practical strategies

The third step in the process was to identify theory-based methods most likely to influence changes in the selected determinants and to identify under which conditions different methods are most likely to be effective. Furthermore, theoretical methods were translated into practical strategies to be delivered in the intervention. Finally, practical strategies (that match the selected change objectives), for delivering the methods to the intervention group were developed.

Results

Step 1: The needs assessment

Brainstorming and the Core-process for applying theory and evidence

The child clinics in Kristiansand have reported that 11% (n=115) and 14% (n=145) of the children aged 5 and 8-9 years old, respectively, are overweight or obese (Gunn Wetrhus, Personal communicator, January 6, 2013). The child growth study shows an increased prevalence of overweight and obesity among Norwegian 8- years old children from 15 % in 2008 to 18% in 2010[27]. Data from 2012 shows decreasing tendencies in the prevalence of childhood overweight and obesity. However, the prevalence still remains high, with 16% of the 8-years old children being overweight or obese [27].

Literature search

The literature search revealed that unhealthy dietary habits have been associated with the development of childhood overweight and obesity [12, 28]. Wate and colleagues [29] found associations between consumption of sugar sweetened beverages and low intake of fruit and vegetables and overweight in adolescents. It has been postulated that eating supper

while watching television or without family supervision, and skipping breakfast have been associated with childhood obesity [28]. Breakfast skipping and breakfast composition has also been related to overweight by Dubois and colleagues [31]. Another study has shown that frequent consumption of takeaways for dinner and irregular meals were associated with overweight among children [29]. In addition, low physical activity level, low sleep duration patterns, high stress level, sedentary lifestyle and high screen-time have been associated with the development of childhood obesity [21, 32, 33, 34]. It is suggested that multi-component family-based behavioral interventions focusing on reducing sedentary behavior, increasing physical activity levels and decreasing fat and sugar in the diet in addition to parental involvement may be effective [35, 36, 37].

Theoretical framework of the present study

Intervention studies promoting physical activity have shown an increased focus on comprehensive theories and models with an ecological perspective. Ecological models includes individual psychology as a part of a larger landscape, with environmental, biological, and cultural aspect [38] .There are many theories aiming to explain why individuals act like they do. Many of the theories have been helpful in developing health-promoting interventions [39]. Palmeira and colleagues analyzed how exercise and psychosocial variables associated with weight management derived from several health behavior change theories (i.e. self-efficacy) predict weight change in a short-term intervention. The theories analyzed were the Self-Determination Theory, the Social Cognitive Theory, the Transtheoretical Model and the Theory of Planned Behavior [39]. Both exercise and weight management psychosocial variables improved during the intervention, with exercise-related variables showing the greatest effect sizes. Weight change was significantly predicted by each of the models under analysis, particularly those including self-efficacy. In addition, importance/effort and intrinsic motivation towards exercise were the stronger predictors of weight reduction [39]. These theories constitute sciences best effort to explain how people's decisions and choices toward health-behavior are built [40]. But the questions about which model or set of variables that could better explain the behavior still remains. An example of an ecological model is the Youth Physical Activity Promotion Model (YPAP) [41].

Based on the health behavior change model PRECEDE-PROCEED by Green and Kreuter[26], Welk proposed a conceptual model to increase physical activity among youth(figure 1).

Focus-group interviews

The focus group interview with school nurses revealed that they experienced challenges in the follow-up of some of the children with overweight and obesity. They had mostly positive experience with measuring the school-children's weight, but most of them had experienced unpleasant telephone conversations with parents when they contacted them to inform them about their children's weight-status and further follow-up. However, they expressed a need to further develop their interpersonal communication skills in order to contact, meet and guide the parents in a professional way. In addition, they requested tips about different activities to suggest for the overweight children. They also expressed the need for information about the challenges of using BMI as a measurement of overweight and obesity in children. One school-nurse stated that not all school- nurses even knew about the Cole`s index for adjusting BMI in children. They also reported the need to improve nutritional knowledge and practical food-handling skills. The need for increased nutritional knowledge among school nurses are supported by a recently published report from the Norwegian Directorate of Health [42].

The interview with one of the leading nurses revealed a discrepancy in relation to the perceptions of needs between the leading nurse and the school nurses. The school-nurses experience of insufficient focus, time, knowledge and skills differed from the leading nurse's opinion.

Interview with parents

Interviews with parents revealed that most of the parents had positive attitudes towards healthy eating and regular meals, but lack of structure and time were barriers to implementing these healthy habits. They experienced grandparents and gatherings as challenging, and called for knowledge and skills in parenting and guiding their children in these situations. The parents experienced time pressure and everyday activities to be a major challenge, in addition to setting adequate limits for the children (table 1). These findings are supported by Haerens and colleagues [43]. Several of the parents were concerned about increased focus on body image and weight loss, and they expressed concerns regarding to stigma being placed on their child through participation in the project.

The ambivalence they expressed regarding project participation is supported in a Norwegian study of parents of overweight children [44]. Parenting a child with weight issues could be a process of loving the child the way he/she is while still wanting changes relating to improved health, resulting in ambivalence.

Table 1: Summary of results from semi-structured interviews of parents (n=8) whose children are overweight/obese

Energy intake:

- Low appetite in the morning (4/8)
- Portion sizes to big (the child eat bigger portion sizes than the parents) (6/8)
- "Obsogenic environment"(grandparents, friends , gatherings)
- "Always hungry", snacking (5/8)
- Sometimes eating in front of TV (5/8)

Energy output

- Not participating in organized physical activity(4/8)
- Walking to school (7/8)
- 1-2 h. screen time every day(8/8)
- Subjective experienced lack of activity in everyday life(8/8)
- Time pressure(making healthy food, play outside, working shift (8/8)

Based on the needs-assessment in step 1 the following determinants of the selected health behaviors were selected (figure1).

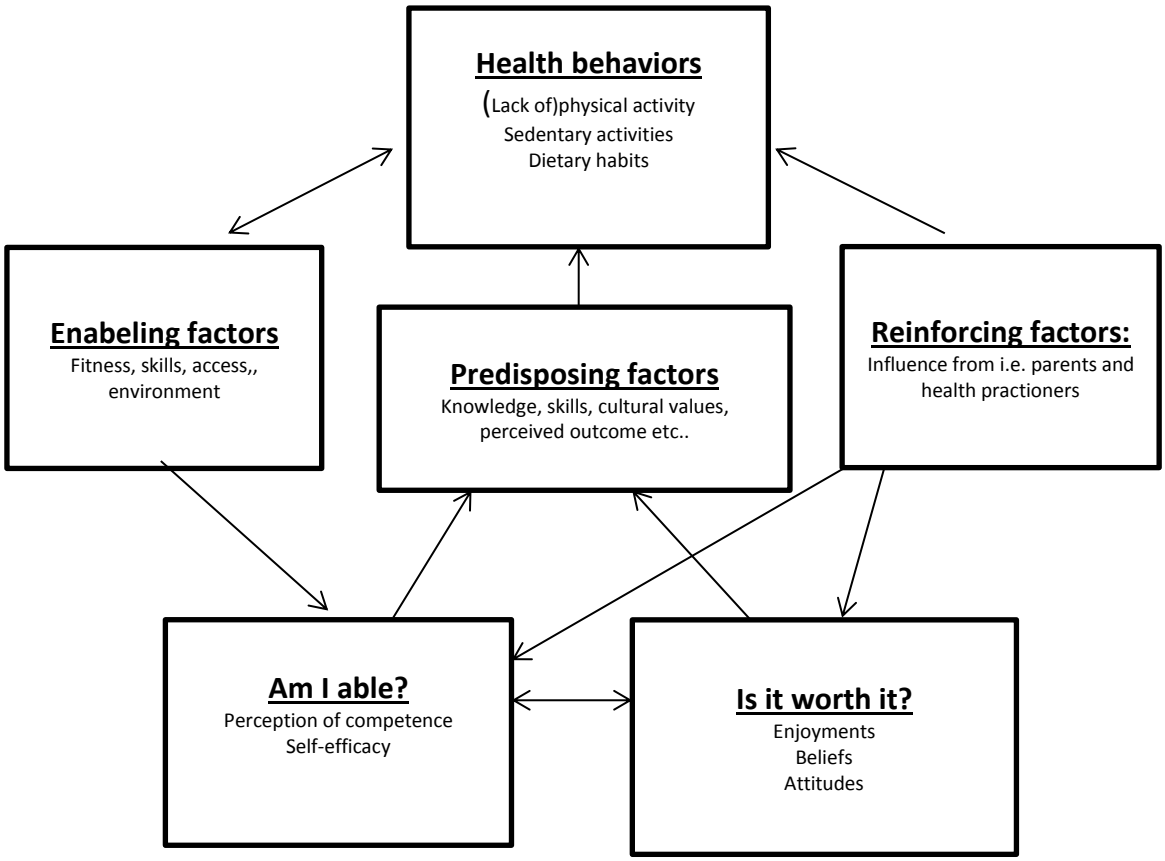

Figure 1: Health behavior and the selected determinants in the intervention

Program objectives

The needs assessment resulted in a selection of 6 key behaviors, and these behaviors were translated into 6 program objectives: 1) Increasing daily physical activity levels to 60 min per day 2) Decreasing sedentary behavior 3) Increasing intake of fruit and vegetables to 5 servings per day 4) Increasing daily intake of water 5) Decreasing daily intake of energy dense food and 6) Increasing number of family meals.

Step 2: Creating matrixes of proximal program objectives

The program objectives (table 2) were subdivided into performance objectives.

Table 2: Example of performance objectives by Self-regulation phase

Self-regulation phase		Performance objectives children
Monitoring phase	1	Children register current state of physical activity level and physical skills
Motivation phase	2	Children register current state of dietary habits
Goal setting phase	3	Children decide to increase Physical Activity
	4	Children decide to decrease sedentary behavior
	5	Children decide to have activity breaks during sedentary activities
	6	Children decide to try new food
	7	Children decide to eat 5 servings of fruit and vegetables each day
	8	Children decide to increase daily intake of water
	9	Children decide to have regular meals every day
	10	Children decide to eat a healthy breakfast every day
Active goal pursuit	11	Children engage in organized and unstructured physical activity
	12	Children have activity breaks during sedentary behaviors (i.e. screen time)
	13	Children develop competence in movement skills
	14	Children become familiar with different kinds of physical activities
Evaluation phase	15	Children monitor achievements according to goals

By crossing determinants with performance objective change objectives were formulated (table 3).

Table 3: Matrix of change objectives: Examples for selected determinants of the sub behavior *engage in unstructured physical activity*.

Performance objective	**Determinants**			
	Self-Efficacy	**Outcome expectations**	**Motivation**	**Attitude**
Children engage in unstructured physical activity	Express confidence in their physical skills	Expect physical activity to be fun Expect physical activity to improve their skills Expect physical activity to make them feel better	Experience competence in the activity Experience autonomy Experience relatedness to the activity	Feel positive about engaging in unstructured physical activity

Step 3

The results from step 3 are practical applications in the intervention (table 6). An overview of the main methods and strategies applied in the intervention and the theories from which they were derived is shown in table 4 and 5.

Table 4: A selection of theoretical methods and practical strategies that will be used on the children in the FRISKUS intervention

Determinant	**Technique/Method (theory)**	**Strategy**
Self-efficacy (SCT)	Demonstrate the behavior(SCT) Set graded tasks(SCT) Active learning((SCT)	Provide opportunities for the child and actively involve them Obstacle course with various options at different levels
	Tailoring(TTM) Individualization(TTM)	One to one instruction in group activity

Outcome-expectations(SCT)	Model/demonstrate the behavior(SCT) Create supportive environment (SCT) Facilitation (SCT)	Trainers demonstrate behavior The trainers give positive feedback in plenum Group rules The activity is at an adequate level
Motivation(SDT) **(Competence)**	Provide relevant inputs(SRT) Feedback (SRT) Set graded tasks (SCT)	Increase knowledge in the trainers about physiology and motor skills so that they can create effective activity-sessions and give positive feedback
(Increase autonomy)	Using cooperative learning (TSD)	The children get to decide an activity Give the participants opportunities to lead
(Relatedness)	Practioner-child relationship (SDT) Create a supportive environment and group identity (SCT)	Composition of the trainers (i.e. young and adult, boy and woman) Create group-accessories, Cultural similarities , Social happenings beside the activity
Attitude	Modeling (SCT) Direct experience(TOL)	Trainers provides and guides fun games and tasks at different levels Trainers provides feedback in plenum

Note: SCT: The Social Cognitive Theory, TTM: Trans Theoretic Theory, SDT: Self-Determination Theory, SRT: Self-regulation Theory, TSD: Theory of Stigma and Discrimination, TOL: Theories of Learning

Table 5: A selection of theoretical methods and practical strategies that will be used on the parents in the FRISKUS intervention

Determinant	Technique/Method (theory)	Strategy
Attitude/Knowledge (TPB)	Arguments (PCM)	Provide information about goal and contents/components included in "Friskus"
	Discussion (TIP)	Lesson in lifestyle-changes including discussion
	Elaboration (TIP)	Community members tell their stories in the local newspaper or in a group-lesson
		Advanced organizers
Self-efficacy/skills (SCT)	Active learning (SCT)	Lesson in diet and lifestyle-changes
		Practical lesson in making healthy meals, including recipe-book
	Cognitive therapy	Individual consultation
	Motivational interviewing (SRT)	
Social support/perceived norms(SCT/TPB)	Arguments (PCM)	Individual consultations
	Discussion (TIP)	Lessons in diet and lifestyle-changes
	Create a supporting environment (SCT)	Other family members have information about the need for and the goal of participating in Friskus,
	Parents share experiences (SCT)	Parents participating in a network/group

Note: SCT: The Social Cognitive Theory, TTM: Trans Theoretic Theory, SDT: Self-Determination Theory, SRT: Self-regulation Theory, TSD: Theory of Stigma and Discrimination, TIP: Theory of Information Processing, PCM: Persuasion-Communication Matrix

Table 6: A selection of Friskus program-materials and the targeted determinant

Strategy	Description	Determinant
Individual consultations (parents)	3-8 individual consultation with health care providers(motivational interview, cognitive therapy)	Knowledge/ Attitude Self-efficacy/ Skills Outcome expectations Social support/perceived norms
Group lessons in diet and lifestyle-changes	Lessons on diet and lifestyle changes and challenges (while children on activity-lesson)	Knowledge/ Attitude Self-efficacy/ Skills Outcome expectations Social support/perceived norms
Parent self-help group	Facilitate parents participating in a group(,i.e. give them tasks, arrange walks)	Social support/perceived norms
Activity-lesson (children)	Group-session in physical activity , preferably led by educated trainers from the local sports-club	Motivation(competence, relatedness, autonomy) Attitude
Advanced organizers in activity and diet	Examples of easy games/activities to do at home/outside, and examples of trips at different levels in the local community Healthy diet advices and recipes	Knowledge
The FRISKUS handbook	Spiral booklet containing information about healthy diet, recipes,	Knowledge Skills

The"FRISKUS-game"	A game that children can play with friends or parents which contains tasks in both physical activity and knowledge.	Motivation Knowledge
Social happenings	Twice a year, the parents and the children decide a social happening that the group can do together	Social support Motivation
"FRISKUS-Equipment	T-Shirt, drinking-bottle	Social support Motivation (by relatedness)

Discussion:

This paper describes the developmental process and the content of the FRISKUS- project. Theory and evidence based development of interventions increases the likelihood of an intervention to be effective [60]. Despite a complex and time-consuming process, the intervention mapping protocol has been a useful tool for planning and development of the health promoting intervention study, FRISKUS. The process has required a time-consuming participation from both scientific and municipal staff, in addition to the data collection conducted. In addition, the municipal leaders are often more focused on result rather than the process. This can lead to some challenges in recruiting key personal for early needs assessments and involving them in the whole process.

The literature highlights the successful use of multi-component intervention in the treatment of childhood obesity, and many studies have been conducted in clinical settings [47]. To our knowledge, there are no family-based, multi-component studies conducted in Norway in community-based settings which can be implemented in the primary health-care system. Therefore, it was necessary to get additional information in order to tailor the intervention. The additional information provided by the school-nurses in the focus-group interview and the parents was useful in developing the FIRSKUS-intervention. However, the focus-group interview revealed a discrepancy within the perception of the challenges within the health-clinic organization.

Collection of additional data from focus-group interview and semi-structured interviews provided valuable information about the challenges and attitudes among school-nurses and

parents. The results in the focus-group interview and in the semi-structured interview were consistent with the literature. The external validity of the FRISKUS intervention was an important issue throughout the entire IM-process. The use of bottom-up approaches (using focus groups and interviews) increases user-perspective and the likelihood of program sustainability long term. The focus-group interview involving school nurses (n=5) , interview with leading nurse (n=1) and the individual interviews with the parents (n=8) included relatively few participants. Thus, the results may be not representative for other school nurses, leading nurses and parents whose children are overweight or obese.

As the literature describes, the need for an ecological approach is important in the treatment for overweight in children. Targeting only the child and the family is not the ultimate solution, as the environment plays a pivotal role in socializing the children and therefore influences the children's health-related behaviors. But the parent's role in changing health behavior is crucial, therefore a family-based intervention were selected.

Conclusions

The FRISKUS- project developed a community-based intervention program for the treatment of overweight in children / prevention of childhood obesity by following the intervention mapping protocol. The intervention can be implemented in a child-clinic/municipal setting.

Theory and evidence based development of interventions increases the likelihood of an intervention to be effective. The intervention program was based on the socio-ecological approach and incorporate findings from formative research. The intervention targets both environmental and personal factors through the social contexts that have an impact on children. This paper contributes to providing more insight into the systematic development of interventions and a more detailed description of the behavior change methods and strategies used. There is little knowledge about the efficacy of interventions in the family-context to treat overweight and prevent obesity. Although this intervention is developed based on theory and evidence, its effectiveness still needs to be evaluated in an evaluation study. Evidence from an evaluation study will provide information on the efficacy of the intervention. If the evaluation study proves that the intervention is effective, a well-developed Intervention will become available for health care providers in the child well clinics and in the municipalities.

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Appendix 1

Forespørsel til helsesøstre om deltakelse i forskningsprosjekt

Bakgrunn og hensikt
Dette er et spørsmål til deg om å delta i en forskningsstudie for å utvikle en intervensjon rettet mot barn med overvekt og deres familie

Hva innebærer studien?
Vi ønsker å intervjue helsesøstre for å kartlegge hvordan det arbeides med denne gruppen med fokus på hvordan vi best kan lage et skreddersydd tilbud til barna og deres familier. Intervjuet vil foregå i grupper som et fokusgruppe-intervju med 4-10 personer. Deltagerne vil alle være helsesøstre med erfaringer eller oppgaver rettet mot barn med overvekt. Vi gjør lydopptak av studien. En observatør knyttet til prosjektet vil være tilstede i møtet.

Mulige fordeler og ulemper
Ved å delta i denne studien får du mulighet til å dele dine erfaringer og ditt syn på hva tiltak rettet mot barn med overvekt og deres familie bør inneholde. Resultatene fra denne studien vil blant annet være en aktivitetsgruppe for barn. I tillegg vil de brukes for å forbedre helsesøsters rolle i dette arbeidet.

Informasjonen som registreres om deg skal kun brukes slik som beskrevet i hensikten med studien. Alle opplysningene vil bli behandlet uten navn og fødselsnummer eller andre direkte gjenkjennende opplysninger. Det er kun undertegnede og veiledere som har adgang til dataene og som kan finne tilbake til deg. Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres.

Frivillig deltakelse
Det er frivillig å delta i studien. Du kan når som helst og uten å oppgi noen grunn trekke ditt samtykke til å delta i studien. Dette vil ikke få noen konsekvenser for din deltagelse i dette eller fremtidige prosjekter. Dersom du ønsker å delta, undertegner du samtykkeerklæringen. Om du nå sier ja til å delta, kan du senere trekke tilbake ditt samtykke uten at det vil få noen konsekvenser for deg.

Dersom du senere ønsker å trekke deg eller har spørsmål til studien, kan du kontakte Linn Gyland på telefon 916 14 157

Personvern
Opplysninger som registreres om deg er kun de svar du bidrar med i fokusgruppe intervjuet. Disse lagres innelåst og blir slettet etter prosjektets slutt senest sommeren 2014.

Rett til innsyn og sletting av opplysninger om deg.
Hvis du sier ja til å delta i studien, har du rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har videre rett til å få korrigert eventuelle feil i de opplysningene vi har registrert. Dersom du trekker deg fra studien, kan du kreve å få slettet innsamlede prøver og opplysninger, med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner.

Samtykke til deltakelse i studien

Jeg er villig til å delta i studien

(Signert av prosjektdeltaker, dato)

Stedfortredende samtykke når berettiget, enten i tillegg til personen selv eller istedenfor

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(Signert av nærstående, dato)

Jeg bekrefter å ha gitt informasjon om studien

(Signert, rolle i studien, dato)

Appendix II

Forespørsel til ledende helsesøster om deltakelse i forskningsprosjekt

Bakgrunn og hensikt
Dette er et spørsmål til deg om å delta i en forskningsstudie for å utvikle en intervensjon rettet mot barn med overvekt og deres familie

Hva innebærer studien?
Vi ønsker å intervjue ledelsen på helsestasjonen for å kartlegge hvordan det arbeides med barn med overvekt. Vi gjør lydopptak av studien. En observatør knyttet til prosjektet vil kunne være tilstede i møtet.

Mulige fordeler og ulemper
Ved å delta i denne studien får du mulighet til å dele dine erfaringer og ditt syn på hva tiltak rettet mot barn med overvekt og deres familie bør inneholde. Resultatene fra denne studien vil blant annet være en aktivitetsgruppe for barn. I tillegg vil de brukes for å forbedre helsesøsters rolle i dette arbeidet.

Informasjonen som registreres om deg skal kun brukes slik som beskrevet i hensikten med studien. Alle opplysningene vil bli behandlet uten navn og fødselsnummer eller andre direkte gjenkjennende opplysninger. Det er kun undertegnede og veiledere som har adgang til dataene og som kan finne tilbake til deg. Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres.

Frivillig deltakelse
Det er frivillig å delta i studien. Du kan når som helst og uten å oppgi noen grunn trekke ditt samtykke til å delta i studien. Dette vil ikke få noen konsekvenser for din deltagelse i dette eller fremtidige prosjekter. Dersom du ønsker å delta, undertegner du samtykkeerklæringen. Om du nå sier ja til å delta, kan du senere trekke tilbake ditt samtykke uten at det vil få noen konsekvenser for deg.

Dersom du senere ønsker å trekke deg eller har spørsmål til studien, kan du kontakte Linn Gyland på telefon 916 14 157

Personvern
Opplysninger som registreres om deg er kun de svar du bidrar med i fokusgruppe intervjuet. Disse lagres innelåst og blir slettet etter prosjektets slutt senest sommeren 2014.

Rett til innsyn og sletting av opplysninger om deg.
Hvis du sier ja til å delta i studien, har du rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har videre rett til å få korrigert eventuelle feil i de opplysningene vi har registrert. Dersom du trekker deg fra studien, kan du kreve å få slettet innsamlede prøver og opplysninger, med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner.

Samtykke til deltakelse i studien

Jeg er villig til å delta i studien

(Signert av prosjektdeltaker, dato)

Stedfortredende samtykke når berettiget, enten i tillegg til personen selv eller istedenfor

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(Signert av nærstående, dato)

Jeg bekrefter å ha gitt informasjon om studien

(Signert, rolle i studien, dato)

Appendix III

Forespørsel til foreldre om deltakelse i forskningsprosjekt

Bakgrunn og hensikt
Dette er et spørsmål til deg om å delta i en forskningsstudie for å utvikle et aktivitetstilbud til barn med overvekt i ditt nærmiljø.

Hva innebærer studien?
Vi ønsker å intervjue foreldre til barn i småskole-alder for å kartlegge hvordan vi best kan lage et skreddersydd tilbud til barna og deres familier. Intervjuet vil foregå som en kartleggingssamtale hos helsesøster knyttet til Friskus-prosjektet. En observatør som er knyttet til prosjektet vil kunne være tilstede i møtet og vil da gjøre lydopptak av samtalen dersom det gis samtykke til dette.

Mulige fordeler og ulemper
Ved å delta i denne studien får du mulighet til å dele dine erfaringer og ditt syn på hva tiltak rettet mot barn med overvekt og deres familie bør inneholde. Resultatene fra denne studien brukes for å forbedre helsetjenestens rolle i dette arbeidet.

Informasjonen som registreres om deg i skal i prosjektet kun brukes slik som beskrevet i hensikten med studien. Alle opplysningene vil bli behandlet uten navn og fødselsnummer eller andre direkte gjenkjennende opplysninger. Det er kun undertegnede og veiledere som har adgang til dataene og som kan finne tilbake til deg. Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres. Helsesøster vil journalføre opplysningene om deg på forskriftsmessig måte.

Frivillig deltakelse
Det er frivillig å delta i studien. Du kan når som helst og uten å oppgi noen grunn trekke ditt samtykke til å delta i studien. Dette vil ikke få noen konsekvenser for din deltagelse i dette eller fremtidige tiltak. Dersom du ønsker å delta, undertegner du samtykkeerklæringen. Om du nå sier ja til å delta, kan du senere trekke tilbake ditt samtykke uten at vil få noen konsekvenser for deg.

Dersom du senere ønsker å trekke deg eller har spørsmål til studien, kan du kontakte Linn Gyland på telefon 916 14 157

Personvern
Opplysninger som registreres om deg er kun de svar du bidrar med i fokusgruppe intervjuet. Disse lagres innelåst og blir slettet etter prosjektets slutt og senest sommeren 2014.

Rett til innsyn og sletting av opplysninger om deg og sletting av prøver
Hvis du sier ja til å delta i studien, har du rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har videre rett til å få korrigert eventuelle feil i de opplysningene vi har registrert. Dersom du trekker deg fra studien, kan du kreve å få slettet opplysninger, med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner.

Samtykke til deltakelse i studien

Jeg er villig til å delta i studien

(Signert av prosjektdeltaker, dato)

Stedfortredende samtykke når berettiget, enten i tillegg til personen selv eller istedenfor

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(Signert av nærstående, dato)

Jeg bekrefter å ha gitt informasjon om studien

(Signert, rolle i studien, dato)

Appendix IV

Intervjuguide helsesøstre

Hvordan bør vi organisere tiltaket for å nå de vi ønsker og oppnå gode resultater?

Fagpersoner / familiemedlemmer

Hvilken rolle bør dere ha?

Hvilke erfaringer har dere med å hjelpe barn med overvekt?

Lykkes (hva var utslagsgivende?)

Mislykkes (hva var utslagsgivende?)

Hvordan er det å ta opp problemer knyttet til overvekt?

Hvilke erfaringer har dere med familier der barn utvikler overvekt?

Foreldrene - ressurser, barrierer, kunnskap og holdninger

Barna – ressurser, problemer, motivasjon, trivsel

Hvilke forventinger har dere til de som skal delta i prosjektet?

Forventninger/ønsker til foreldre/barn

Forventninger/ønsker til seg selv og sitt team

Hvordan vil det være for dere å henvise til prosjektet?

Hvordan tror dere et slikt tiltak vil virke?

Hva vil være utslagsgivende for å få effekt?

Hvem er det viktig å samarbeide med?

Appendix V

Intervjuguide ledende helsesøster

Hvordan bør vi organisere tiltaket for å nå de vi ønsker og oppnå gode resultater?

Fagpersoner / familiemedlemmer

Hvilken rolle bør dere ha?

Hvilke erfaringer har du/dere med å hjelpe barn med overvekt?

Lykkes (hva var utslagsgivende?)

Mislykkes (hva var utslagsgivende?)

Hvordan er det å ta opp problemer knyttet til overvekt?

Hvilke erfaringer har du/dere med familier der barn utvikler overvekt?

Foreldrene - ressurser, barrierer, kunnskap og holdninger

Barna – ressurser, problemer, motivasjon, trivsel

Hvilke forventinger har du til de som skal delta i prosjektet?

Forventninger/ønsker til foreldre/barn

Forventninger/ønsker til seg selv og sitt team

Hvordan vil det være for dere å henvise til prosjektet?

Hvordan tror dere et slikt tiltak vil virke?

Hva vil være utslagsgivende for å få effekt?

Hvem er det viktig å samarbeide med?

Hva tenker du er de organisatoriske barrierene for helsesøstrene i dette arbeidet?

Tid?

Økonomi?

Mangel på støttende systemer?

Mangel på verktøy?

Andre?

I hvilken grad opplever du at helsestasjonen evner å jobbe målrettet og effektivt i forhold til denne gruppen?

Kvalitetssikring?

Fagutvikling?

På hvilken måte imøtekommer helsestasjonen kravet om fagutvikling og kvalitetssikring?

Appendix VI

Intervjuguide foreldre (Kartleggingsskjema som helsesøster bruker)

Pasientdata/deltaker	Dato for oppstart i prosjekt:
Navn	Fødselsdato/personnr
Adresse	Postnr/Sted
Navn foresatte Far:	 Mor:
Mb:	Mb:
Hvem bor barnet hos til daglig?	Hvis skilte foreldre: Utfordringer ift kosthold?
Hvem følger barnet i prosjektet?	
	Viktige hendelser /belastninger nå:
Stikkord for diskusjon/uenighet i familien ift å være med i prosjektet.	
Kartlegging	
Høyde ved oppstart	Vekt ved oppstart
ISO-KMI ved oppstart	Midjemål
Sykdommer	Faste medisiner
Kosthold	
Vaner	Hvor mange dager/uke spiser dere frokost? (utfordringer ift frokost, trøtt, ikke sulten, liker ikke maten, forskjell på voksen/barn?)
Hvor mange faste måltider har dere ila dagen? (kartlegging av rytmer ift mat. Faste og mellommåltider. Forskjell på voksen/barn?)	
	Hva bruker dere som tørstedrikk? Utfordringer her?
Hvor mange måltider spiser familien sammen? (opplevde utfordringer ift dette?)	Hvor mange ganger i uka er det middag? (Opplevde utfordringer ift dette?)

Forsyner man seg selv av middag eller blir man servert?	Praktiseres tre-deling av tallerkenen? (kjøtt/poteter/grønnsaker, utfordringer ift dette?)
Hvor mange dager/uke drikker dere brus /juice/kakao/litago, andre søtede drikker?	Praktiseres lørdagsgodt? (kjøper barnet selv? Grenser, opplevde utfordringer?)
Hvordan praktiserer dere tilgang på følgende matvarer: Chips, godteri, kjeks, boller/kake? (Utfordringer ift dette? Hvor mange dager /uke? forskjell på voksen/barn?)	Hvordan praktiserer dere tilgang på frukt/grønnsaker? (utfordringer ift dette? liker ikke, vondt i magen)
Har barnet tilgang på mat etter skoletid? (hva pleier barnet å velge? mengde? grenser?)	Hvordan praktiserer dere tilgang på godteri/kjeks/kaker mellom måltider? (grenser, utfordringer?)
Utfordringer	
Er barnet alltid sulten? (Opplevde utfordringer ift det?	Hvilke rutiner har dere ift mat foran tv/pc? (grenser, utfordringer her?)
Mat som trøst(utfordringer ift det	Mat som belønning,(utfordringer ift det)
Spiser barnet mer enn foreldrene?	Grenser/utfordringer knytta mot måltid (barnet er kresent, vil ikke sitte ved bordet, grinete ved måltider, utfordringer med andre barn)
Aktivitet	
Deltar barnet på organiserte aktiviteter? (utfordringer knyttet til det?)	Deltar foresatte på faste aktiviteter? (utfordringer knytta til det?)
Hvor mye tid bruker dere som familie daglig på hverdagsaktivitet ? (gå/sykle til butikk, hund, leikeplass daglig etter middag osv.	Hvilke hindringer opplever dere ift hverdagsaktivitet? (Hverdagsklemma Nærområde Flere barn i fam. Lite ork/slitne foreldre)
Hvor mye tid bruker barnet ditt på hverdagsaktivitet? (Leik ute, gå tur med hunden, gå til venner, leikeplass	
Hvor mye tid bruker ditt barn på Tv/pc/spill daglig? (utfordringer knytta til det?)	Hvor mye tid bruker de voksne i familien på Tv/pc/hjemmekontor? (utfordringer knytta til det?)
Praktiseres fast leggetid for barnet? Når? (utfordringer knytta til det?)	Praktiseres regler for TV/PC/Spilltid? (utfordringer knytta til det?)

Hvor mange Tvèr er det i huset?	Har barnet egen TV på rommet?
Hvordan kommer barnet seg til skolen? (utfordringer)	Forteller barnet noe om aktivitet i friminuttene? (utfordringer knytta til det?)
Kan du tenke deg noen faktorer som begrenser familien aktivitet, som ikke er kommet fram her?	Kan du tenke deg noen faktorer som begrenser barnets aktivitet som ikke er kommet fram her?
Tanker om endring	
Hvilke tanker har du om å være med i prosjektet?	Hvem /hva begrenser?
Hva er det verste som kan skje?	Hva er det beste som kan skje ved endring?
Hva skal til for at du/dere skal klare å endre?	Hvilke råd ville du gitt til en venn som skal endre livsstil?
Hvem/hva er støttespillere for endring?	Hvordan kan vi være din heiagjeng/støttespiller?
Hvor viktig er det for deg at barnet ditt er fysisk aktiv? Skala fra 1-10. Hvorfor X og ikke lavere?	Hvor viktig er det for deg at familien din og du er fysisk aktive? Skala fra1-10. Hvorfor X og ikke lavere?
Hvor stor tro har du på at barnet ditt kan bli mer fysisk aktiv? Skala fra 1-10. Hvorfor X og ikke lavere?	Hvor stor tro har du på at familien din og du kan bli mer fysisk aktive? Skal fra 1-10. Hvorfor X og ikke lavere?
Hvor viktig er det for deg at barnet ditt endrer kosthold? Skal fra 1-10. Hvorfor X og ikke lavere?	Hvor viktig er det for deg at familien din og du endrer kosthold? Skala fra 1-10. Hvorfor x og ikke lavere?
Hvor stor tro har du på at barnet ditt kan endre kosthold? Skal fra 1-10. Hvorfor x og ikke lavere?	Hvor stor tro har du på at familien din og du kan endre kosthold? Skal fra 1-10. Hvorfor x og ikke lavere?
Tanker om mål	
Hva er vanskeligst for deg/dere å endre på?	Hva ville være lettest for deg/dere å endre på?
Konkrete utfordringer du ønsker veiledning på?	Hvor er du/dere når prosjektet er slutt?

Appendix VII

Matrix of selected predisposing factors / determinants in children

Self-regulation		Self-efficacy(SCT)	Outcome-expectations (SCT)	Motivation (SDT)	Attitude (TPB)
Monitoring phase	*Children observe current state of physical skills*				
Motivation phase	*Children decide to complete/participate in the program*		Expect participating in the program will be fun and can make them feeling better/be more healthy		
	Children decide to challenge themselves		Expect that challenging themselves can give results		
	Children decide to be more active in everyday-life	Express confidence in their ability to be more active	Expect that being more active can improve their health and wellbeing		Feel positive about being more active in everyday-life
	Children decide to have activity breaks during sedentary activities	Express confidence in their ability to have activity-breaks	Expect that activity breaks will have impact on their health		

	Children decide to try new food	Express confidence in themselves trying new food	Expect that trying new food will improve their health		
	Children decide to eat 5 servings of fruit and vegetables each day		Expect to feel better and be more healthy		Feel positive about eating fruit and vegetables
	Children decide to increase water-intake		Expect to feel better and be more healthy		Feel positive about increasing water intake
	Children decide to have regular meals every day		Expect to feel better and be more healthy		Feel positive about eating regular meals
	Children decide to eat a healthy breakfast every day		Expect to feel better and be more healthy		Feel positive about eating a healthy breakfast every day
	Children decide to decrease screen-time		Expect to have better health		Feel positive about decreasing screen-time

Goal setting phase	*Children set attainable goals*	Express confidence in their ability to improve health	Expect to reach the goals		Feel positive about goalsetting
Active goal pursuit	*Children engage in organized physical activity*	Express confidence in their physical skills	Expect physical activity to be fun Expect physical activity to improve their skills Expect physical activity to make them feel better	Experience competence in the activity Experience autonomy Experience relatedness to the activity	Feel positive about engaging in organized physical activity
	Children engage in unstructured physical activity	Express confidence in their physical skills	-Expect physical activity to be fun -Expect physical activity to improve their skills -Expect physical activity to make them feel better	Experience competence in the activity Experience autonomy Experience relatedness to the activity	Feel positive about engaging in unstructured physical activity
	Children have activity breaks during sedentary behaviors(i.e. screen time)		Expect that activity breaks will have impact on their health	Experience competence in the activity Experience autonomy	Feel positive about having activity breaks

				Experience relatedness to the activity	
	Children develop competence in movement skills	Express confidence in their physical skills	Expect to feel more competent when participating in physical activities (incl. Playing with peers)	Experience competence in the activity Experience autonomy Experience relatedness to the activity	Feel positive about developing competence in movement skills
	Children become familiar with different kinds of physical activities	Express confidence in their abilities/physical skills	-Expect new activities to be fun -Expect to cope with new activities	Experience competence in the activity Experience autonomy Experience relatedness to the activity	Feel positive about experience different kinds of physical activities
Evaluation phase	*Children monitor achievements according to goals*				Feel positive about monitoring their achievements

Note: Colored boxes are the change-objectives included in the intervention

Appendix VIII

Matrix of selected predisposing factors/ determinants in parents

Self-regulation phase	**Performance objective**	**Attitudes /Knowledge (TPB/)**	**Self-efficacy/ Skills (SCT)**	**Outcome expectations (SCT)**	**Social Support/ Perceived norms(SCT/TPB)**
Monitoring phase	*Parents monitor current state of physical activity among the children*	Feel positive about monitoring current state of physical activity Knows what to include in the term "physical activity"		Expect monitoring to be a helpful method for lifestyle changes	Recognize that other in the group are monitoring their children's physical activity
	Parents monitor current state of dietary patterns in the children	Feel positive about monitoring current state of dietary patterns Knows what to include as dietary intake (i.e. snacking, drinks)		Expect monitoring to be a helpful method for lifestyle changes	Recognize that other in the group are monitoring their children's dietary patterns
	Parents monitor current state of sedentary time among the children	Feel positive about monitoring current state of sedentary time Knows what to include in the term "sedentary time"		Expect monitoring to be a helpful method for lifestyle changes	Recognize that other in the group are monitoring their children's sedentary behaviors
	Parents monitor sleep-patterns/duration among the children	Feel positive about monitoring current state of sleep patterns		Expect monitoring to be a helpful method for lifestyle changes	Recognize that other in the group are monitoring their children's sleep-patterns

	Parents monitor their cooperation(between parents)	Feel positive about monitoring Knows what to monitor	Knows how to reveal cooperation Knows how to monitor cooperation	Expect monitoring to be a helpful method for lifestyle changes	Recognize that other in the group are monitoring their cooperation
	Parents monitor their parental leadership and parenting skills (limit-setting/limitation for the children's health-related behaviors)	Feel positive about monitoring Explain elements in parental leadership that is important in guiding their children towards a healthier lifestyle	State what skills are needed to be an authoritative parent	Expect monitoring to be a helpful method for lifestyle changes	Recognize that other in the group are monitoring their parental leadership
	Parents observe themselves as role models for health-related behavior	Feel positive about monitoring Knows what behaviors that are health-related	State how to be a healthy role model	Expect observing themselves to be a helpful method for lifestyle changes	Recognize that other in the group are observing themselves as role -models
	Parents reflect on the children's lifestyle-habits/health-related behaviors?	See the health benefit of changing the behavior of the children Compare the children's lifestyle according to the national recommendations	Have skills in reflection	Expects that reflecting on the children's habits will reveal changeable habits	Accepts that normal weight children often are more physical active
	Parents reflect on their parental leadership and parenting skills	See the benefit of improved parental leadership and parenting skills Knows what parental leadership and parenting skills that are	Have skills in reflection	Expects that reflection on , and awareness of their skills and parental leadership will give them useful information on what to change or improve	Recognizing that others in the group/family/peers are reflecting on their parental leadership and parenting skills

	Parents reflects on their cooperation (between parents)	See the benefit of reflecting on their cooperation Knows what is meant by cooperation	Have skills in reflection	Expects that reflection on the cooperation will give them useful information on what to change or improve	Recognizing that others in the group/family/peers are reflecting on their cooperation
	Parents reflect on themselves as role models for health-related behaviors	- See the benefit of themselves as healthy role-models Knows what behaviors that are health-related	Have skills in reflection	Expects that reflection on the cooperation will give them useful information on what to change or improve	Recognizing that others in the group/family/peers are reflecting on their modeling
Motivation phase	*Parents decide to complete/participate in the program*	Feel positive about participating in the program Knows what components that are included in the program Knows the consequences of not making lifestyle-changes Knows what will improve by participating in the program -	Express confidence in the child completing the program Express confidence that they can cope with barriers that can prevent them from participating in the program	Expect that participating in the program will result in a healthier lifestyle for the child	Recognize participating in the program as a positive factor in the family and in the environment/among peers
	Parents decide to challenge themselves	Have a realistic idea/opinion of the challenge Knows to what extends they need to challenge themselves	Express confidence in challenging themselves Have the needed skills to perform the challenges	Expects to cope with the challenges	Perceive support from others in the group/family/friends/peers

	Parents decide to be actively involved in group sessions	Sees the benefit of being actively engaged in group sessions Knows the importance of parents being actively involved in the children's activities	Express confidence in being actively involved in the program Have the skills needed to be actively involved	Expect their child to have improved health by them participating in the activities	Recognize that other parents are actively involved
Goalsetting phase	*Parents set challenging but attainable goals to improve the children's lifestyle habits/ health-related behaviors*	Sees the benefit in setting goals Identify challenging but attainable goals	Have confidence in that goals are attainable Have skills in evaluating what is achievable	Expect to accomplish /achieve the goals Expect their child to be healthier when the goals are achieved	Recognize goal setting as a common "tool" in the group
	Parents set goals for parent-child relationship(i.e. parenting skills, parental leadership and themselves as healthy role models	Sees the benefit of setting goals Knows important factors in the parent-child relationship	Have confidence that they will attain the goals Demonstrate parental leadership, parenting skills and healthy role-modeling	Expects the lifestyle-changes to be more achievable by them improving their parental leadership, parenting skills and their health-related role-modeling	Parents recognize positive support from the group and the environment
	Parents create an action plan to achieve the goals	Sees the benefits of creating an action plan Knows how to create an action plan	Have confidence that they can follow the plan and achieve the goals	Expects that creating a plan will help them to achieve the goals	Recognize that others in the group are creating a plan

Active goal pursuit	***Diet***				
	Parents plan the family meals for minimum 3 days	Sees the benefit of planning and structuring their meals Explain the contents of a healthy menu Can evaluate and rate recipes	Express confidence in themselves planning Can read and understand nutrition declaration and food labels	Expect that planning will result in more structure and a healthier lifestyle for the family and child	Recognize that others in the group are planning their meals
	Parents plan purchase	Sees the benefit of planning Can read and understand nutrition declaration and food labels	Express confidence in reading and understanding nutrition declaration and food labels and evaluate the product Can read and understand nutrition declaration and food labels	Expect that planning purchase will help them to get more structure in the every-day life	Recognize that others in the group are planning purchase
	Parents plan for implementation	Sees the benefit of planning	Express confidence in implementing the menu		Recognize that others in the group are planning for implementation
	Parents makes time/allocate time	Sees the benefit of planning	Express confidence in making time Have skills in structuring the family-life and the day/week	Expect that planning will result in a healthier lifestyle for the family and child	
	Parents makes the meals	See the benefits of making meals Feel positive about making	Express confidence in themselves making a healthy meal	Expect that planning will result in a healthier lifestyle for the family and child	Recognize that others in the group/family/peers are making meals

		meals Knows what is a healthy meal	Demonstrate how to make a healthy meal		
	Parents serve adequate portion size to the children	Feel positive about serving adequate portion size Sees the benefit of serving adequate portion size Describe adequate portion size	Have confidence in themselves serving adequate portion sizes(both in dietary-knowledge and in limit-setting) Demonstrate adequate portion size	Expects that serving adequate portion size to the children will have impact on the total energy-intake and health	Recognize that others in the group are serving adequate portion size to their children
	Parents serve a healthy breakfast	Sees the benefits of serving a healthy breakfast State the contents of a healthy breakfast Knows the consequences of not eating breakfast	Express confidence in making a healthy breakfast Demonstrate making a healthy breakfast	Expect that making breakfast will result in a healthier lifestyle for the family and child	Recognize that others in the group/family/peers are serving a healthy breakfast
	Parents serve regular meals	Sees the benefits of serving regular meals Knows the consequences of not eating regular meals Knows the impact on health when not eating regular meals	Express confidence in serving regular meals	Expects that serving regular meals will improve the children's well-being and health	Recognize that others in the group/family/peers are serving regular meals

	Parents prepare food with focus on:				
	Reduced fat(< 30 E% of daily intake)	Sees the benefits in decreasing fat in the diet Knows the problems of eating a diet high in fat	Express confidence in reading and understanding food- labels	Expect their child to be healthier after reducing fat in the diet	Recognize that others in the group /family /peers are decreasing fat in the diet. Accept that normal weight children consume less fat
	Reduced sugar-content	Sees the benefit in decreasing sugar in the diet Knows the problems of eating a diet high in sugar	Express confidence in reading and understanding food- labels	Expect their child to be healthier after reducing sugar in the diet	Recognize that others in the group /family/peers are decreasing sugar in the diet. Accept that normal weight children consume less sugar
	Increased intake of fruit and vegetables(5 portions per day)	Sees the benefit in increased intake of fruit and vegetables State number of servings that are recommended Knows the impact of fruit and vegetables on the children's health	Express confidence in serving 5 portions a day Demonstrate how to serve appetizing fruit and vegetables	Expects the children to be healthier after increasing the consumption of fruit and vegetables	Recognize that others in the group are increasing servings of fruit and vegetables.
	Increase water drinking	Knows the benefit and impact that replacing soft drinks and beverages with water can have on energy-intake Knows the consequences of drinking to little water	Express confidence in increasing the family's water-intake Have the skills to set limits according to what the children drink	Expect their children to be healthier when replacing soft drinks and beverages with water	Recognize that others in the group are increasing daily intake of water on the expense of soft-drinks and beverages

	Physical activity				
	Parents set goals for everyday-activity/ unstructured physical activity	Sees the benefits in their child being physical active. Knows the consequences of lack in physical activity Knows the impact of physical activity on well-being and health	Express confidence in themselves making a supporting and encouraging environment Demonstrate encouraging their child to physical activity	Expect their child to be healthier after increasing the everyday-activity	Recognize that others in the group/family/peers are increasing their everyday activity
	Parents set goals for active transport	Sees the benefits in active transport Knows the consequences of lack in physical activity Knows the impact of physical activity on well-being and health	Express confidence in themselves to encourage and support the child	Expect their child to be healthier after increasing active transport	Recognize that others in the group/family/peers are increasing their active transport
	Parents set goals for their children to participate in organized physical activities	Sees the benefits of their child participating in organized activities Knows the impact of participating in organized activities(both psychosocial and physical)	Express confidence in themselves to encourage and support the child to participate In organized physical activities Have the skills create a supportive environment	Expect their child to be healthier after participating in organized physical activity	Recognize that others in the group/family/peers are participating in organized physical activity

	Parents set goals for decreasing the children's sedentary behavior	Sees the benefits of decreasing sedentary behavior Know the health consequences of sedentary behavior		Expect their child to be healthier after decreasing sedentary behavior	Recognize that others in the group/family/peers are decreasing the child's sedentary behaviors
	Parent-child relationship				
	Parents set goals for being a healthy role model	Feel positive about being a healthy role model Knows what behaviors that are health-related Knows about their impact on their children and the environment	Express confidence in	Expect that they can have impact on their children's health by being healthy role-models Expect that the children will have a healthy home-environment	Recognize that others in the group/family/peers are being healthy role models
	Parents set goals for improving their parental skills(i.e. setting limits, parental leadership, making structure)	Sees the benefits in being authoritative parents Knows how to be a authorative parent (i.e. having limits and have a good relationship)	Express confidence in their parenting skills Demonstrate parenting skills	Expect their children to change lifestyle as a consequence of them being authoritative parents Expect that strengthening the parental leadership will help the child to achieve the necessary behavioral changes	Recognize that others in the group/family/peers are being authoritative
	Parents set goals for establishing adequate sleep patterns	Sees the benefits in having adequate sleep patterns Knows the health consequences of insufficient	Are confident in that they are capable of establishing (and maintaining) an adequate sleep pattern	Expect their child to feel better and be healthier after establishing adequate sleep patterns	Recognize that others in the group are establishing sleep patterns

		sleep Define adequate amount of sleep	Have the skills to set limits according to bed-time		
Evaluation phase	*Parents monitor achievements of the children*	See the benefit in monitoring Compare current state with earlier behavior	Express confidence in monitoring Have the skills needed to evaluate		Recognize that others in the group are monitoring the achievements
	Parents decide, based on the children's achievements, to proceed pursuing their goal or state a new goal	Sees the benefit in pursuing or stating a new goal Assess their achievements	Express confidence in themselves proceeding pursuing the goals	Expect that stating goals are helpful in behavior changes	Parents recognize that others in the group/family/peers are establishing adequate sleep patterns in their child
	Parents make a long time planning	Sees the benefits in long-time planning Knows the importance of long-time planning	Express confidence in themselves as long-time planners Demonstrate planning skills	Expects that a long time plan can help them/the children to a healthier lifestyle	Parents recognize that others in the group are making long-time plans

Note: Colored boxes are the change-objectives included in the intervention

Appendix IX

Basic methods, methods by determinants and some parameters for use.

	Methods	**Parameters for use**
Basic methods at individual level	Participation(Empowerment theories)	Requires willingness ,appropriate motivation and skills
	Belief selection(TPB)	Requires investigation of the current attitudinal, normative and efficacy beliefs of the individual before choosing the beliefs on which to intervene
	Persuasive communication(SCT)	Messages need to be relevant and not to discrepant from the beliefs of the individual, can be stimulated by surprise and repetition. Will include arguments
	Active learning(SCT)	Time, information and skills
	Tailoring(TTM)	Tailoring variables or factors related to behavior change
	Individualization(TTM)	Personal communication that responds to a learners needs
	Modeling (SCT)	Attention, remembrance, self-efficacy and skills, reinforcement of model, identification with model, coping model instead of mastery model
	Feedback	Feedback needs to be individual, follow the behavior in time and be specific
	Reinforcement and punishment(SCT)	Reinforcement and punishment need to be tailored to the individual or group, to follow the behavior in time, and to be seen as a consequence of the behavior
	Facilitation(SCT)	Requires real changes in the environment; identification of barriers and facilitators; power for making changes ,and usually intervention at a higher level to facilitate conditions on a lower level
Methods within Cognitive therapy	role playing	
	Imagery and reframing	
	Graded exposure	
	Activity monitoring and scheduling,	
	Listing advantages and	

	disadvantages of beliefs	
	Socratic questioning	
	Core belief worksheet	
Methods within motivational interview	Agenda setting	
	supporting self- efficacy	
	Expression of sympathy and development of discrepancy	
	Rolling with resistance	
	Periodic summarization	
Basic methods on the environmental level	Modeling(SCT)	Appropriate models will vary by level
	Mass media role modeling (SCT)	Messages need to be relevant and not to discrepant from the beliefs of the individual, can be stimulated by surprise and repetition. Will include arguments
	Entertainment-education, edutainment	Consideration of source and channel, balance of media professionals and health promoters needs
	Behavioral journalism(SCT)	Adequate role models from the community and elicitation interviews to describe the behavior and the positive outcome
	Mobilizing social networks	Availability of social network and potential support givers
	Enhancing network linkages	Available network

	Developing new social network linkages	Willingness of networks to reach out, availability of networks that can provide appropriate support and linkage agents
	Use of lay health workers	Natural helpers in community with opinion leader status and availability to volunteer for training
Determinant	**Method**	**Parameter for use**
Knowledge	Chunking(TIP)	Labels or acronyms are assigned to material to aid memory
	Advance organizers(TIP)	Schematic representations of the content or guides to what is to be learned
	Using imagery(TIP)	Familiar physical or verbal images as analogies to a less familiar process
	Discussion(TIP)	Listening to the learner to ensure that the correct schemas are activated
	Elaboration(TIP)	Individuals with high motivation and cognitive ability, messages that are personally relevant, surprising ,repeated, easily understandable and include direct instructions
	Providing cues(TIP)	Cues work best when people are allowed to select and provide their own cues
Attitudes	Classical conditioning	Most effective when the time interval is short and the conditioned stimulus precedes the unconditioned stimulus
	Self-reevaluation (TTM,SCT)	Stimulation of both cognitive and affective appraisal of self-image
	Environmental reevaluation (TTM, SCT)	Stimulation of both cognitive and affective appraisal to improve appraisal and empathy skills
	Shifting perspective	Initiation from the perspective of the learner; needs imaginary competence
	Arguments	For central processing and arguments they need to be new to the message receiver
	Direct experience	Rewarding outcomes from the individuals experience with the behavior or assurance that the individual can cope with and reframe negative outcomes
	Elaboration	Individuals with high motivation and cognitive ability, message that is relevant, surprising, repeated, self-pacing, easily understandable and includes direct instructions, messages that are not to discrepant and cause anticipation of interaction
	Anticipated regret(TPB)	Stimulation of imagery, assumes a positive intention to avoid the risky behavior
	Repeated exposure	Neutrality of original attitude
	Cultural similarity	Using surface characteristics of the target group enhances receptivity. Using social-cultural characteristics lead to a more positive reception of the message
Social Influence	Information about others approval(TPB)	Positive expectations are available in the environment
	Resistance to social	Commitment to earlier intention, relating intended behavior to values, psychological inoculation against pressure

	pressure(TPB)	
	Shifting focus(TPB)	Preferably shift focus to a new reason for performing the behavior
	Stimulate communication to mobilize social support(TPB)	Combines caring, trust, openness and acceptance with support for behavioral change, positive support is available in the environment
	Provide opportunities for social comparison	Upward comparison may help setting better goals, downward comparison may help feeling better or more self-efficacious
Skills, self-efficacy	Guided practice(SCT,TSR))	Subskill demonstration, instruction and enactment with individual feedback, requires supervision by an experienced person, some environmental changes cannot be rehearsed
	Modeling(SCT)	Attention, remembrance, self-efficacy and skills, reinforcement of model, identification with model, coping model instead of mastery-model. Appropriate models will vary by level,
	Behavioral journalism	Adequate role models from the community and elicitation interviews to describe the behavior and the positive outcome
	Enactive mastery experiences (SCT,TSR)	Requires willingness to accept feedback
	Verbal persuasion/exhortation (SCT,TSR)	Credible source
	Improving physical and emotional states(SCT)	Must carefully interpret and manage emotional states
	Reattribution training(TSR)	Requires counseling or bibliotherapy to make unstable and external attributions for failure
	Self-monitoring of behavior (TSR)	The monitoring must be of the specific behavior. The data must be interpreted and used. The reward must be reinforcing to the individual
	Provide contingent rewards(TSR)	Rewards need to be tailored to the individual or group to follow the behavior in time and to be seen as a consequence of the behavior
	Cue altering(TSR)	Existing positive intention
	Public commitment	Needs to be a public announcement, may include contracting
	Goal-setting(TSR)	Commitment to the goal, goals are difficult but available within the individuals skill level
	Set tasks on a gradient of difficulty(SCT,TSR)	The final behavior can be reduced to easier but increasingly difficult sub-behaviors
	Planning coping	Identifications of high-risk situations and practice of coping response

	responses(TSR)	
Motivation(SDT)	Social environment provides support for autonomy, competence and relatedness	
	Motivational interview	
	Enhance intrinsic motivation	
	Investigate reasons for participating and encourage to identify own reasons for behavior change	
	Acknowledge individuals conflict of goals and emphasize with the difficulties involved	Must be in the context of highlighting their autonomous reasons for behavior change
(Experience of autonomy)		
-Identified regulation	Information about value/importance of a behavior	
-integrated regulation	Supporting individuals as they explore resistances and barriers to change, and helping them identify congruent pathways to health.	
	Using cooperative learning	
	Giving the participants	

	opportunities to lead drills and practices	
	Acknowledging competence	
	Adopting a questioning approach	
(Experience of competence)	Provide relevant inputs and feedback (The individual is afforded the skills and tool for change, and is supported when competence or control-related barriers emerge. The individual is helped to experience mastery)	
	Increase autonomy	
(Experience of relatedness)	Practioner – child/patient-relationship is good, based on respect, understanding and caring for	

Note: TPB: Theory of Planned Behavior, SCT: Social Cognitive Theory, TSR: Theories of Self-Regulation, TTM: Trans Theoretical Model, TIP: Theories of Information Processing, SDT: Self-Determination Theory,.

Appendix X

Change objectives by determinants-children.

Determinant: Self-efficacy		
Change objectives	**Methods:**	**Application**
Express confidence in their ability to be more active	Peer-modeling, planning coping responses, tailoring,	Provide opportunities for the child and actively involve them
Express confidence in their ability to improve health	Peer-modeling, planning coping responses, tailoring, individualization	Provide opportunities for the child and actively involve them
Express confidence in their physical skills	Guided practice, active learning, set tasks on a gradient of difficulties, tailoring ,individualization	One to one instruction in group activity, obstacle course(obstacle-course) with various options at different levels Group rules

Determinant: Outcome expectations		
Change objectives	**Methods**	**Application**
Expect participating in the program will be fun and can make them feeling better/be more healthy	Peer-modeling, direct experience, increased knowledge, facilitation	The presentation of Friskus is catchy, The “friskus-game”
Expect that being more active can improve their health and wellbeing	Peer-modeling, increased knowledge, explore attitudes	Trainers explain what happens in the body when being active (I e. Muscles and heart capacity)
Expect that activity breaks will have impact on their health	Peer-modeling, increased knowledge, explore attitudes	Trainers explain what happens in the body when being sedentary
Expect to feel better and be more healthy	Peer-modeling, direct experience, increased knowledge	Instructor tell about her good feelings after (vigorous) activity
Expect physical activity to be fun	Peer-modeling, direct experiences, set tasks on a gradient of difficulties,	Group activities are at a level that the children experience as fun(i.e. playing games, using motivational factors), The “friskus-game”
Expect physical activity to improve their skills	Peer-modeling , increased knowledge, direct experience	The trainers give positive feedback in plenum
Expect physical activity to make them feel better	Peer-modeling, increased knowledge	The activity is at an adequate level(but the children needs to challenge themselves

Expect that activity breaks will have impact on their health	Peer-modeling ,increased knowledge	Trainers explain what happens in the body when they are i.e. short of breath and tired in the muscles
Expect to feel more competent when participating in physical activities (including. Playing with peers)	Direct experience, feedback, create supportive environment	Trainers provide tasks and activities that can relate to their activity in leisure time
Expect to cope with new activities	Peer-modeling, direct experiences, set tasks on a gradient of difficulties,	Trainers provide tasks and activities that can relate to their activity in leisure time The “friskus-game”

Determinant: Motivation		
Change objectives	**Methods**	**Applications**
Experience competence in the activity	Provide relevant inputs, feedback, increase autonomy, active learning, set tasks on a gradient of difficulty, repetition	Increase knowledge in the trainers about physiology and motor skills so that they can create an effective activity-session and give positive feedback
Experience autonomy in the activity	Using cooperative learning, give the participants opportunities to lead , support	The children get to decide an activity,
Experience relatedness to the activity	Practioner-child relationship, create a supportive environment , group cohesion , create group identity,	Composition of the trainers (i.e. young and adult, boy and woman) Create group-accessories, cultural similarities , social happenings beside the activity

Determinant: Attitude		
Change objectives	**Methods**	**Applications**
Feel positive about being more active in everyday-life	Knowledge, peer-modeling, modeling by parents, direct experience, facilitation	Trainers create a supportive environment , provides feedback in plenum, discuss and highlight successive stories from within the group, The “friskus-game”
Feel positive about eating fruit and vegetables	Knowledge, peer-modeling, modeling by parents, direct experience, facilitation	Children get reward (i.e. stickers) on a «friskus-monitor» The “friskus-game”
Feel positive about increasing water intake	Knowledge, peer-modeling, modeling by parents ,direct experience, facilitation	Children get reward (i.e. stickers) on a «friskus-monitor», The “friskus-game”
Feel positive about eating regular meals	Knowledge, peer-modeling, modeling by parents, direct experience, facilitation	Children get reward (i.e. stickers) on a «friskus-monitor»
Feel positive about eating a healthy breakfast every day	Knowledge, peer-modeling, modeling by parents, direct experience, facilitation	Children get reward (i.e. stickers) on a «friskus-monitor», The “friskus-game”
Feel positive about decreasing screen-time	Knowledge, peer-modeling, modeling by parents, facilitation	Children get reward (i.e. stickers) on a «friskus-monitor»
Feel positive about engaging in organized physical activity	Knowledge, peer-modeling, modeling by parents, direct experience, facilitation	Children get reward (i.e. stickers) on a «friskus-monitor»
Feel positive about engaging in unstructured physical activity	Knowledge, peer-modeling, modeling by parents, direct experience, facilitation	Children get reward (i.e. stickers) on a «friskus-monitor», The “friskus-game”
Feel positive about having activity breaks	Knowledge, peer-modeling, modeling by parents, direct experience, facilitation	Trainers provide fun activities they can use as a “burst”, The “friskus-game”
Feel positive about developing competence in movement skills	Knowledge, peer-modeling, modeling by parents, direct experience, facilitation, Imaginary	Trainers highlight/create expectations of what the children can expect to do (i.e. participate In more games in leisure-time), The “friskus-game”
Feel positive about experience different kinds of physical activities	Knowledge, peer-modeling, modeling by parents, direct experience, facilitation	Trainers provide fun games and tasks The “friskus-game”,
Feel positive about monitoring their achievements	Set tasks on a gradient of difficulties, feedback,	Trainers find something to reward no matter what(i.e. the good work he has done, one to one instruction, The “friskus-game”

Appendix XI

Change objectives by determinants-parents

Determinant: Attitude/Knowledge		
Change objectives	**Methods**	**Application**
Feel positive about participating in the program	Cultural similarity Knowledge, attitude	Include only children in the same situation Provide information about goal and contents/components included in "Friskus"
Knows the consequences of not making lifestyle-changes	Knowledge, discussion, arguments	Lesson in lifestyle-changes
Knows what will improve by participating in the program	Environmental reevaluation, Modeling	Community members tell their stories in the local newspaper or in a group-lesson Lesson in lifestyle-changes
Have a realistic idea/opinion of the challenge		Individual consultation , Lesson in lifestyle-changes
Sees the benefit of being actively engaged in group sessions Knows the importance of parents being actively involved in the children's activities	Environmental reevaluation	Lessons in diet and lifestyle-changes
Sees the benefit in setting goals	Arguments	Lessons in and lifestyle-changes , individual consultations
Sees the benefit of planning and structuring their meals Explain the contents of a healthy menu Can evaluate and rate recipes	Discussion, elaboration	Lessons in diet and lifestyle-changes
Can read and understand nutrition declaration and food labels		Lessons in diet and lifestyle-changes
See the benefits of making meals Feel positive about making meals Knows what is a healthy meal		Lessons in diet and lifestyle-changes Advanced organizers
Feel positive about serving adequate portion size	Arguments	Lessons in diet and lifestyle-changes

Sees the benefit of serving adequate portion size Describe adequate portion size		Advanced organizers
Sees the benefits of serving a healthy breakfast State the contents of a healthy breakfast Knows the consequences of not eating breakfast		Lessons in diet and lifestyle changes
Sees the benefits of serving regular meals Knows the consequences of not eating regular meals Knows the impact on health when not eating regular meals	Arguments	Lessons in diet and lifestyle changes
Sees the benefits in decreasing fat in the diet Knows the problems of eating a diet high in fat	Arguments	Lessons in diet and lifestyle changes
Sees the benefit in decreasing sugar in the diet Knows the problems of eating diet high in sugar	Arguments, persuasive communication	Lessons in diet and lifestyle changes
Sees the benefit in increased intake of fruit and vegetables State number of servings that are recommended Knows the impact of fruit and vegetables on the children's health	Arguments	Lessons in diet and lifestyle changes
Sees the benefits replacing soft drinks and beverages with water can have on the energy-intake Knows the impact that replacing soft drinks and beverages with water can have on energy-intake Knows the consequences of drinking to little water	Arguments	Lessons in diet and lifestyle changes
Sees the benefits in their child being physical active. Knows the consequences of lack in physical activity Knows the impact of physical activity on well-being and health	Arguments	Lessons in diet and lifestyle changes
Sees the benefits in active transport Knows the consequences of lack in physical activity Knows the impact of physical activity on well-being and health	Arguments	Lessons in diet and lifestyle changes
Sees the benefits of their child participating in organized activities	Arguments	Lessons in diet and lifestyle changes

Knows the impact of participating in organized activities(both psychosocial and physical)		
Sees the benefits of decreasing sedentary behavior Know the health consequences of sedentary behavior	Arguments	Lessons in diet and lifestyle changes
Feel positive about being a healthy role model Knows what behaviors that are health-related Knows about their impact on their children and the environment	Arguments, discussion, persuasive communication	Lessons in diet and lifestyle changes
Sees the benefits in being authoritative parents Knows how to be a authorative parent (i.e. having limits and have a good relationship)	Arguments, discussion	Lessons in diet and lifestyle changes
Sees the benefits in having adequate sleep patterns Knows the health consequences of insufficient sleep Define adequate amount of sleep	Arguments	Lessons in diet and lifestyle changes
Compare current state with earlier behavior	Monitoring, discussion	Individual consultation, discussions in group lessons
Sees the benefits in long-time planning Knows the importance of long-time planning	persuasive communication, modeling	Individual consultation, community-members members tell their stories in the local newspaper,

Determinant: Self-efficacy/Skills		
Change objectives	**Methods**	**Application**
State what skills are needed to be an authoritative parent	Modeling	Lesson In lifestyle changes, individual consultations
State how to be a healthy role model	Modeling	Lesson In lifestyle changes, individual consultations
Express confidence in the child completing the program Express confidence that they can cope with barriers that can prevent them from participating in the program	Cognitive therapy, Motivational interviewing	Individual consultations, Lesson In lifestyle changes
Have the needed skills to perform the challenges	Cognitive therapy, Motivational interview	Individual consultations, Lesson In lifestyle changes
Express confidence in being actively involved in the program Have the skills needed to be actively involved	Cognitive therapy, Motivational interview	Individual consultations

Have confidence in that goals are attainable		Individual consultations
Have confidence that they will attain the goals Demonstrate parental leadership, parenting skills and healthy role-modeling	Cognitive therapy, Motivational interviewing	Individual consultations
Have confidence that they can follow the plan and achieve the goals	Cognitive therapy, Motivational interview	Individual consultations
Can read and understand nutrition declaration and food labels	Advanced organizers	Lesson In diet and lifestyle changes
Have skills in structuring the family-life and the day/week	Cognitive therapy, Motivational interview	Individual consultations
Express confidence in themselves making a healthy meal Demonstrate how to make a healthy meal	Cognitive therapy, Motivational interview, Modeling	Lesson in diet and lifestyle-changes. Practical lesson in making healthy meals, recipe-book
Have confidence in themselves serving adequate portion sizes(both in dietary-knowledge and in limit-setting) Demonstrate adequate portion size	Cognitive therapy, Motivational interview, active learning	Lesson in diet and lifestyle-changes
Express confidence in making a healthy breakfast Demonstrate making a healthy breakfast	Active learning	Lesson in diet and lifestyle-changes
Express confidence in reading and understanding food-labels	Active learning	Lesson in diet and lifestyle-changes, recipe-book
Express confidence in serving 5 portions a day Demonstrate how to serve appetizing fruit and vegetables	Active learning	Lesson in diet and lifestyle-changes, Practical lesson in making healthy meals, recipe-book
Have the skills to set limits according to what the children drink	Cognitive therapy, Motivational interviewing	Individual consultation
Express confidence in themselves to encourage and support the child to participate In organized physical activities Have the skills create a supportive environment	Cognitive therapy, Motivational interviewing	Individual consultations
Express confidence in their parenting skills Demonstrate parenting skills	Cognitive therapy, Motivational interviewing	Individual consultations
Have the skills to set limits according to bed-time	Cognitive therapy , Motivational interview	Individual consultations

Express confidence in themselves proceeding pursuing the goals	Cognitive therapy, Motivational interviewing	Individual consultations

Determinant: Outcome expectations		
Change objectives	Methods	Application
Expect that participating in the program will result in a healthier lifestyle for the child	Arguments,, persuasive communication	Individual consultations, Community members tell their stories in the local newspaper or in a group-session
Expects to cope with the challenges	Cognitive therapy, Motivational interviewing	Individual consultations
Expect their child to have improved health by them participating in the activities	Knowledge, environmental reevaluation	Individual consultations, lessons in lifestyle changes
Expect to accomplish /achieve the goals Expect their child to be healthier when the goals are achieved	Cognitive therapy, Motivational interviewing	Individual consultations
Expects the lifestyle-changes to be more achievable by them improving their parental leadership, parenting skills and their health-related role-modeling	Cognitive therapy, Motivational interviewing,	Individual consultations
Expect that planning will result in more structure and a healthier lifestyle for the family and child	Cognitive therapy, Motivational interviewing	Individual consultations
Expects that serving adequate portion size to the children will have impact on the total energy-intake and health	Knowledge, arguments	Lessons in diet and lifestyle-changes
Expect that making breakfast will result in a healthier lifestyle for the family and child	Knowledge, arguments	Lessons in diet and lifestyle-changes
Expects that serving regular meals will improve the children's well-being and health	Knowledge, arguments	Lessons in diet and lifestyle-changes
Expect their child to be healthier after reducing fat in the diet	Knowledge ,arguments	Lessons in diet and lifestyle-changes

Expect their child to be healthier after reducing sugar in the diet	Knowledge, arguments	Lessons in diet and lifestyle-changes
Expect their children to be healthier when replacing soft drinks and beverages with water	Knowledge, arguments	Lessons in diet and lifestyle-changes
Expect their child to be healthier after increasing the everyday-activity	Knowledge, arguments	Lessons in diet and lifestyle-changes
Expect their child to be healthier after increasing active transport	Knowledge, arguments	Lessons in diet and lifestyle-changes
Expect their child to be healthier after participating in organized physical activity	Knowledge, arguments	Lessons in diet and lifestyle-changes
Expect their child to be healthier after decreasing sedentary behavior	Knowledge, arguments	Lessons in diet and lifestyle-changes
Expect that they can have impact on their children's health by being healthy role-models Expect that the children will have a healthy home-environment	Cognitive therapy, Motivational interviewing	Individual consultations
Expect their children to change lifestyle as a consequence of them being authoritative parents Expect that strengthening the parental leadership will help the child to achieve the necessary behavioral changes	Cognitive therapy, Motivational interviewing	Individual consultations
Expect their child to feel better and be healthier after establishing adequate sleep patterns	Knowledge, arguments	Lesson In lifestyle-changes
Expect that stating goals are helpful in behavior changes	Cognitive therapy, Motivational interviewing	Individual consultations

Determinant :Social support/ Perceived norms		
Change objectives	Methods	Application
Accepts that normal weight children often are more physical active	Knowledge, arguments	

Recognize participating in the program as a positive factor in the family and in the environment/among peers	Create a supporting environment	Parents participating in a network/group, Other family members have information about the need for and the goal of participating in Friskus
Perceive support from others in the group/family/friends/peers	Create a supporting environment	Parents participating in a network/group, Other family members have information about the need for and the goal of participating in Friskus
Recognize that other parents are actively involved	parents share experiences	
Recognize that others in the group are serving adequate portion size to their children	Discussion, parents share experiences	Parents participating in a network/group
Recognize that others in the group /family /peers are decreasing fat in the diet. Accept that normal weight children consume less fat	Discussion, parents share experiences	Parents participating in a network/group
Recognize that others in the group /family/peers are decreasing sugar in the diet. Accept that normal weight children consume less sugar	Discussion, parents share experiences	Parents participating in a network/group
Recognize that others in the group are increasing servings of fruit and vegetables.	Discussion, parents share experiences	Parents participating in a network/group
Recognize that others in the group are increasing daily intake of water on the expense of soft-drinks and beverages	Discussion, parents share experiences	Parents participating in a network/group
Recognize that others in the group/family/peers are increasing their everyday activity	Discussion, parents share experiences	Parents participating in a network/group
Recognize that others in the group/family/peers are increasing their active transport	Discussion, parents share experiences	Parents participating in a network/group
Recognize that others in the group/family/peers are participating in organized physical activity	Discussion, parents share experiences	Parents participating in a network/group
Recognize that others in the group/family/peers are decreasing the child's sedentary behaviors	Discussion, parents share experiences	Parents participating in a network/group
Recognize that others in the group/family/peers are being healthy role models	Parents share experiences ,Cognitive therapy, Motivational interviewing	Parents participating in a network/group, Individual consultations
Recognize that others in the group/family/peers are being authoritative	Parents share experiences ,Cognitive therapy, Motivational interviewing	Parents participating in a network/group Individual consultations

Recognize that others in the group are establishing sleep patterns	Parents share experiences	Parents participating in a network/group