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**SCHOOL NURSES' USE OF
MOTIVATIONAL INTERVIEWING AS
A METHOD FOR HEALTH PROMOTING
CONVERSATIONS WITH PARENTS OF
PRIMARY SCHOOL CHILDREN**

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School nurses' use of Motivational Interviewing as a method for health promoting conversations with parents of primary school children

THESIS FOR DOCTORAL DEGREE (Ph.D.)

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POPULÄRVETENSKAPLIG SAMMANFATTNING

Skolsköterskor i Sverige har ett viktigt uppdrag att stödja barn till hälsosamma levnadsvanor. Idag finns inga vetenskapligt utvärderade och effektiva metoder för hälsosamtal med fokus på föräldraskap och främjande av hälsosamma vanor för barn i skolåldern. *Motiverande samtal* (MI) är en personcentrerad samtalsmetod som har visat sig vara effektiv för att stödja beteendeförändring hos vuxna.

En Frisk Skolstart är ett hälsofrämjande och förebyggande familjestödsprogram utvecklat för grundskolan med fyra komponenter, varav MI är en av dessa komponenter. Det övergripande syftet med denna avhandling var att utvärdera skolsköterskors MI-kompetens och potential att främja hälsosamma beteenden hos familjer samt att undersöka skolsköterskors och föräldrars erfarenheter av att delta i MI-samtal. Den här avhandlingen inkluderar fyra studier:

Den **första** studien utforskade vad föräldrar till normalviktiga barn fokuserar på under hälsosamtalen när det gäller barnens mat- och rörelsevanor. Resultaten visade att föräldrar huvudsakligen fokuserar på fem specifika områden, nämligen 1) barnets personlighet och preferenser, 2) föräldrars uppfattning av barnets befintliga vanor, 3) föräldrars ansvar och strategier, 4) interaktion i situationer med mat- och rörelse, och 5) kontextuell påverkan på främjandet av barnets vanor. Dessa fynd kan vägleda skolsköterskor hur de kan förbereda sig för hälsosamtal med föräldrar.

Den **andra** studien undersökte föräldraskapsstrategier vad det gäller mat och måltider, samt skillnader i strategier mellan föräldrar till barn med olika viktstatus. Resultaten visade att föräldrar till normalviktiga barn oftare använde *tvingande* strategier i matsituationer medan föräldrar till barn med etablerad övervikt eller obesitas oftare använde *restriktiva* strategier.

Den **tredje** studien relaterade skolsköterskors MI-kompetens till förändringar i barns mat- och rörelsebeteenden. Resultaten visade att MI-kompetens som en av fyra komponenter i programmet inte direkt kunde relateras till förändringar i barnens beteenden. Men, när hänsyn togs till om barnet följde rekommenderade beteenden vid baslinjen, var några av de samtalsmetodiska teknikerna relaterade till förbättrade beteenden.

Den **fjärde** studien undersökte skolsköterskors och föräldrars erfarenheter av att genomföra och delta i MI-samtalen. Resultaten visade bland annat på att både skolsköterskor och föräldrar uppskattade bärande element av MI i de hälsofrämjande samtalen såsom skolsköterskans empatiska förmåga samt känslan av partnerskap och jämställdhet i samtalet.

Sammanfattningsvis visar denna avhandling att både skolsköterskor och föräldrar uppskattade bärande element av MI i de hälsofrämjande samtalen. Resultaten kan bidra till att vidare utveckla MI för hälsofrämjande och förebyggande samtal med föräldrar om barns hälsosamma vanor i allmänhet och om mat- och rörelsevanor i synnerhet.

POPULAR SCIENCE SUMMARY OF THE THESIS

School nurses in Sweden have an important task to support children in forming healthy behaviours. Nonetheless, there are no evaluated and effective methods for health conversations focusing on parenting practices and promotion of healthy behaviours for school aged children. *Motivational Interviewing* (MI) is a person-centred conversational technique that has been shown to be effective for supporting behaviour change in adults.

A Healthy School Start Plus is a health promoting family support programme with four components, of which MI given to parents is one. The overall aim of this doctoral thesis was to evaluate school nurses' MI competence and potential for promoting healthy behaviours in families, and to explore school nurses' and parents' experiences of participating in MI-sessions. This thesis includes four studies:

The **first** study explored parents' thoughts regarding their normal weight children's food and physical activity behaviours as expressed during health conversations with the school nurse. Conclusions were that parents focus the conversation in five specific areas, namely 1) children's personality and preferences; 2) beliefs of what constitutes healthy behaviours for children; 3) parents' responsibility and strategies; 4) interaction in situations around food and physical activity; and 5) contextual circumstances for promoting healthy behaviours. These findings can guide nurses on how to prepare for health promoting conversations with parents.

The **second** study aimed to investigate if parents' feeding practices differ in relation to child weight status. Results were that parents of normal weight children scored higher on *pressuring* practices in situations around food, whereas parents of children with overweight or obesity scored higher on *restrictive* practices.

The **third** study explored if school nurses' MI competence is associated with change in children's dietary and physical activity behaviours. Findings suggest that MI competence as one of four components in the programme was not directly related to children's behaviour change. Nonetheless, when considering child adherence to recommended behaviours at baseline, some specific MI techniques were significantly associated with improved food and physical activity behaviours.

The **fourth** study explored school nurses' and parents' perceptions of delivering and participating in the MI sessions. Conclusions were for example that both school nurses and parents appreciated core elements of MI during the health promoting conversations such as school nurses' empathetic ability and the sense of partnership and equality during the conversations.

In sum, findings from this thesis were that both school nurses and parents appreciated core elements of MI during the health promoting conversations. These results could contribute to the further development of MI for health promoting conversations with parents about children's healthy behaviours in general, and about food and activity behaviours in particular.

ABSTRACT

School nurses in Sweden have an important task to promote healthy behaviours in children through regular health conversations with parents and children. Nonetheless, there are no evidence-based methods in Sweden for health conversations focusing on parenting practices and promotion of healthy behaviours for school aged children. *Motivational Interviewing* (MI) is a person-centred conversational technique that has been shown to be effective for behaviour change in adults. Valid and reliable procedures for estimating practitioners' MI competence helps us understand potential intervention effects. However, MI competence in health promoting situations has rarely been studied, and practitioners' and participants' experiences of MI are often overlooked.

A Healthy School Start Plus (HSSP) is a health promoting family support programme with four components, of which MI given to parents is one. HSSP was carried out in primary schools in disadvantaged areas in and around Stockholm, Sweden from November 2017 to April 2018 as a universal intervention targeting parents. Families of 353 children (aged 5-7 years) from 17 schools participated in the HSSP trial. This thesis used data from the seven intervention schools where school nurses had conducted the MI sessions with parents.

The overall aims of this doctoral thesis were to evaluate school nurses' MI performance and potential to positively influence child behaviour through health promoting conversations with parents, as well as to explore school nurses' and parents' experiences of delivering and participating in MI sessions. This thesis includes four studies:

Study I explored parents' thoughts regarding their normal weight children's food and physical activity behaviours as expressed during health conversations with the school nurse. This study applied a qualitative explorative inductive study design using sampled data with a maximum variation from the seven intervention schools. Parents focus the conversation in five specific areas when discussing their children's food and physical activity behaviours: 1) children's personality and preferences; 2) beliefs of what constitutes healthy behaviours for children and possible consequences; 3) thoughts around parents' responsibility and strategies; 4) how parents interact with their children around food and physical activity; and 5) contextual circumstances for promoting healthy behaviours.

Study II aimed to investigate if parents' feeding practices differ in relation to child weight status. This cross-sectional study used baseline data from both intervention and control schools. Results showed that parents of normal weight children had higher scores on *Pressuring to eat* than parents of children with overweight or obesity, whereas parents of children with overweight or obesity scored higher on *Restriction for health and weight control* when compared to parents of children with normal weight.

Study III explored if objective ratings of the quality of school nurses' MI were associated with change in children's food intake and physical activity behaviours. We also wanted to investigate if the child's adherence to recommended behaviours at baseline was of

importance for behaviour change. This study applied a before–after uncontrolled study design and data were obtained from the seven intervention schools. Objectively assessed MI competence did not reach established quality standards and was not associated with child behaviour change in the whole group. However, when considering child adherence to recommended behaviours at baseline, some of the global scores were significantly associated with improved food and physical activity behaviours.

Study IV explored school nurses' and parents' perceptions of delivering and participating in the MI sessions and attempted to illustrate how objective and subjective ratings of the MI sessions resonate with school nurses' and parents' perceptions of the same MI sessions. This study applied a mixed-methods study design (QUAL+QUANT) using both interview questions and quantitative data. Results suggest that school nurses' MI performances were rated and perceived as valuable and family-centred by both school nurses and parents. Parents had left the meeting feeling motivated and empowered to promote their children's healthy behaviours. Nonetheless, school nurses were critical of their own MI technical performance.

In sum, the health promoting conversations were overall appreciated and perceived as respectful by both parents and school nurses, and school nurses found MI brought a more equal power balance to the health conversation. Some feeding practices differed between parents of children different weight status. Parents of children with normal weight expressed thoughts and sought support from the school nurse regarding five specific areas.

Conclusions drawn from this thesis can be used for further developing school nurses' health promoting conversations aimed at parenting practices fostering healthy child behaviours. Future studies should focus on further development of MI techniques to be used in health promotion and of methods for evaluating MI competence in the context of universal health promotion.

LIST OF SCIENTIFIC PAPERS

- I. **Parents' Thoughts Regarding their Normal-Weight Children's Food and Physical Activity as Expressed During Health Conversations with the School Nurse: A Qualitative Analysis Informing Health-Promoting Practices**
Moberg, M; Golsäter, M; Norman, Å
Journal of School Nursing, 2021(June). DOI: 10.1177/10598405211025440.
- II. **Parents' feeding practices differ according to children's weight status: a cross-sectional study from Sweden**
Moberg, M; Elinder, LS; Golsäter, M; Norman, Å.
Manuscript
- III. **"Sometimes It Felt Great, and Sometimes It Just Went Pear-Shaped": Experiences and Perceptions of School Nurses' Motivational Interviewing Competence: A Convergent Mixed-Methods Study**
Moberg, M; Lindqvist, H; Andermo, S; Norman, Å.
Clinics and Practice. 2022(12). DOI: 10.3390/clinpract12030039
- IV. **Motivational Interviewing in the school setting – associating school nurses' skills with children's behaviour change**
Moberg, M; Lindqvist, H; Elinder, LS; Norman, Å.
Submitted

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LIST OF ABBREVIATIONS

ANCOVA	Analysis of covariance
ANOVA	Analysis of variance
BMI	Body-mass index
BMI-sds	Age standardised body-mass index
CPFQ	Comprehensive Feeding Practices Questionnaire
HF	Healthy foods
HSS	The A Healthy School Start programme
HSSP	The A Healthy School Start Plus trial
ICC	Intra-class correlation coefficient
MI	Motivational Interviewing
MIA	MI adherent
MINA	MI non-adherent
MINT	Motivational Interviewing Network of Trainers
MIQA	Motivational Interviewing Quality Assurance
MITI	Motivational Interviewing Treatment Integrity
MVPA	Moderate to vigorous physical activity
NCDs	Non-communicable diseases
NNR	Nordic Nutrition recommendations
PFP	Parental Feeding Practices
R:Q	Reflection-to-question ratio
SB	Sweet beverages
SDGs	Sustainable development goals
UF	Unhealthy foods

1 INTRODUCTION

Children's health and well-being, traditionally considered a domestic concern, started to become a matter of public interest in Europe and North America during the late 19th century. Here, non-governmental initiatives provided poor families with milk for weaning children out of solidarity, to prevent hunger and suffering. These actions, together with high levels of child mortality, sparked a political debate that prompted attempts to establish publicly funded efforts to promote child welfare and health development (1). Similarly, in Sweden, the interest in children's health sprang out of voluntary initiatives. In 1937, child health services were formalized by the Swedish government, which stated that all children's health and well-being should be of public concern, and subsequently the first public child health centres emerged (2). As regards school health services, already in 1892 Sweden had official policies for school physicians, although the services initially targeted only boys from well-off families. Later, as formal schooling became the societal norm also for less privileged children, the first school nurse was officially employed in Stockholm in 1913. Her presence was considered an incentive for poor families to send their child to school and her duty was primarily to take care of socially deprived children, providing them with food, health care, and hygiene, including attending to hair lice and providing baths (3). In a parallel debate, throughout the 20th century, all children's right to health and dignity was advocated amongst world leaders (4) and with a most recent update in 1990, children's right to a healthy life was further acknowledged through the publication of the *Convention on the Rights of the Child* (5). Finally, in 2020, the Swedish parliament declared the convention a law.

School nurses in Sweden have a unique position in the health system, located at the schools where they reach all children and families with health promoting activities, regardless of socioeconomic position (6). This thesis explores how school nurses' health promoting conversations with parents could be a stepping-stone for evidence-based practices for promoting healthy food and physical activity behaviours in primary school children.

2 LITERATURE REVIEW

2.1 SHIFTING FOCUS: FROM SURVIVING TO THRIVING

Over the last decades, the global discourse regarding children's health has primarily focused on children surviving their first years of life (1, 7). Today, with timely and coordinated interventions throughout the continuum of children's lifecycle (8) most children in the world survive their fifth birthday (9).

2.1.1 Global trends in the panorama of non-communicable diseases

Non-communicable diseases [NCDs] such as cardiovascular diseases, diabetes, and various cancers, are the main causes of mortality in adults worldwide, and the cause of approximately forty percent of premature deaths (10). NCDs are increasing globally (11) and are the primary cause of human suffering and global burden of disease (12) as well as contributing to massive health care spending (13). However, most NCDs could be prevented through interventions focusing on promoting healthier lifestyles regarding, e.g., diet, physical activity, and healthy weight development (14-18). The public health relevance NCDs is further reflected in the United Nations Sustainable Development Goals (SDGs). The 17 SDGs were presented in 2015 as an effort to unify the global community to collectively make systematic interventions to achieve a better and sustainable world. Two important SDGs for promotion of children's health are Goal 3 to *Ensure healthy lives and promote well-being for all*, and goal 10 to *Reduce inequality within and between countries*. Here, both child survival and prevention of lifestyle-related non-communicable diseases are accentuated as important measures for health promotion (19). Moreover, there is a growing body of evidence that health behaviours and conditions established during childhood are likely to track from childhood through adolescence and into adult life (20-24). Hence it is argued that healthy behaviours should be promoted from an early age to prevent disease and to improve quality of life.

2.2 BEHAVIOURS AFFECTING CHILD HEALTH AND DEVELOPMENT

Nutritional imbalances due to poor-quality foods deficient in essential nutrients and vitamins, overnutrition, and insufficient physical activity are emerging as a major threat to children's health, undermining their potential growth and development (21). By reducing the intake of calories and energy-dense foods and beverages, and balancing physical activity and sedentary behaviours, overweight and associated health conditions can be prevented (25). Estimations are that 20 percent of children and adolescents are overweight or have obesity in middle- and high-income countries (21, 26). This is also true for children living in Sweden, where reports state that 10, 20 and 30 percent of preschool children, school children and adolescents, respectively, are overweight or have obesity (27). Moreover, an increasing prevalence of overweight and obesity over the life course is reported in Sweden, where today 50 percent of the adult population are overweight or have obesity (28).

Regarding physical activity, WHO guidelines recommend a daily average of 60 minutes of moderate to vigorous activity [MVPA] for children, and to limit sedentary behaviours (29).

However, a population-based survey has concluded that children living in Sweden do not reach the recommended food intake or physical activity. Moreover, health-related behaviours were found to deteriorate with age (30). Similar trends have been observed regarding physical activity in other countries (31). An updated version of the Nordic Nutrition recommendations [NNR] will be released in 2023 (32). Meanwhile, the current version of the NNR recommends that children living in the Nordic countries should consume 400 g of fruits and vegetables daily and that a maximum of 10 percent of their energy should come from added sugars (33).

One short term benefit of promoting healthy food behaviours in children is improved oral health (34). Moreover, physical activity seems to have a direct positive impact on cognitive functioning and self-esteem in children and adolescents (35). In the longer perspective, an unhealthy diet and inadequate physical activity strongly increase the risk of developing obesity and chronic NCDs such as diabetes (18), cardiovascular disease (17), various forms of cancer (15, 16), and undesirable mental health outcomes, e.g., depressive disorders (35).

2.2.1 Determinants of child health and development

What shapes our behaviours and health potential is both complex and well theorized, spanning from inherent biological and social factors to community and macro-level influences (36). The social-ecological model was first developed by psychologist Urie Bronfenbrenner, who in the 1970s conceptualized how various determinants in a person's life interact with and affect health outcomes (37). Since then, the social-ecological model has become one of the most well-known and adapted conceptual models in the field of public health (38). For the purpose of this thesis and for contextualizing the determinants of children's healthy food and physical activity behaviours a model was created (**Figure 1**) inspired by the social-ecological model (37).

The socio-ecological model (37) describes four *systems* that influence individuals on different levels of society. Translated to determinates for children's food and physical activity behaviours, the *micro*-system includes individual factors for growth and development such as age, personality, and acquired knowledge. Children's *meso*-system includes factors related to relations and behaviours in the immediate family, such as parenting practices, health literacy, household composition, economy, and family mental and physical health status. As the child grows older, other social networks such as friends, and social media become more influential on child behaviours; these also belong to the *meso*-system. *Exo*-level includes factors on a community level such as the built environment, e.g., playgrounds, safe spaces, and routes for activity, as well as social networks such as school climate and organised sports activities. On the *macro*-level, societal factors like the political climate, welfare systems, structural discrimination, and social norms influence child behaviours.

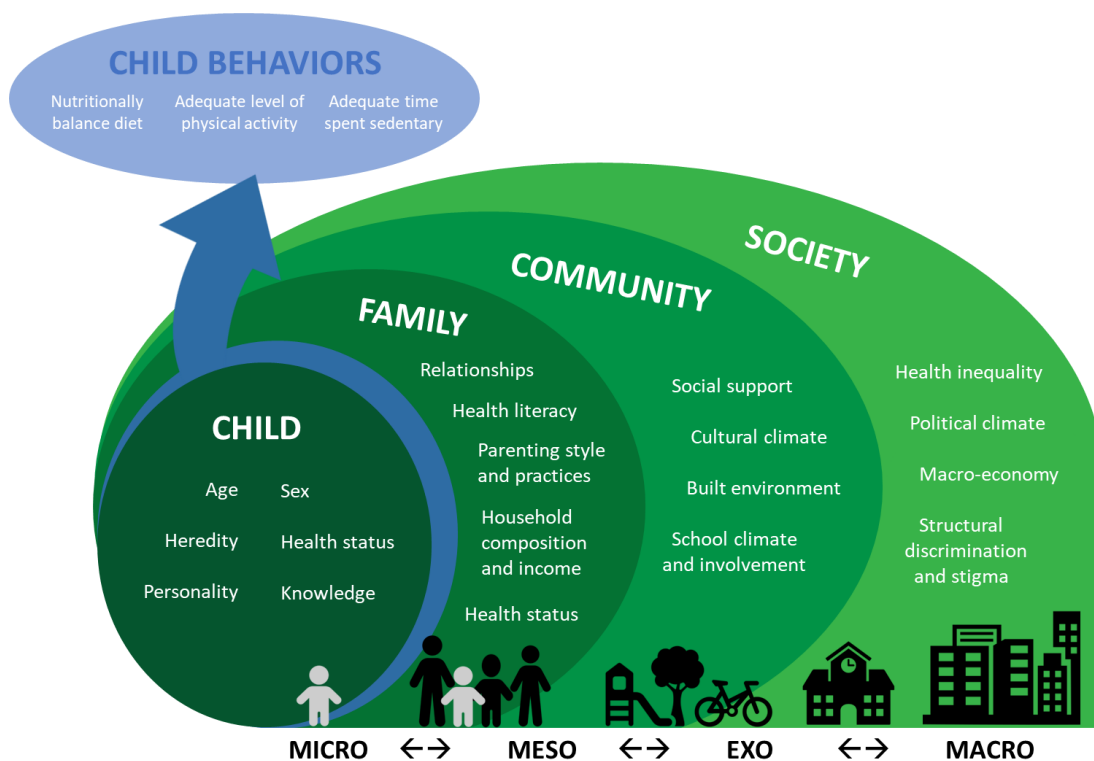


Figure 1. Determinants of children's food and physical activity behaviours.

2.2.2 Family factors influencing children's behaviours

The health behaviours of young children are directly dependent on their family and social environment (39-42). Child development is shaped by inherited and environmental factors and what is considered normal and expected development varies widely. Developmental transition from pre-school age (4–6 yrs.) to school age (7–9 yrs.) comes with more advanced abstract and logical cognition as well as enhanced motor skills (43). With age, most children develop from being dependent in most situations to being capable and autonomous. Hence, the support older children need from their surroundings differs from that of younger children, and parents may require help adapting their practices to meet the needs of the growing child (44). Programmes targeting parents seem to be more effective than interventions including only children, for promoting healthy lifestyle behaviours (45, 46). Therefore, the recommendation is that health promoting interventions, focusing on diet and physical activity, should include parents of young children (46, 47). Studies show that parents might find it challenging to promote a healthy lifestyle for their children in today's obesogenic environment, and parents express a need for support both from the health care sector and from society to cope with these challenges (48). Also, previous studies showed that parents mostly know *what* behaviours to promote to children, but not always *how* to manage the task (49).

2.2.2.1 Parenting styles and practices

Parents' view of their role as parents, and parent–child relations differ between and within families. The concept of *parenting styles* was first developed by psychologist Diana

Baumrind as an attempt to describe how parents' style of interaction affects their adolescent children (50). *Parenting style* has been described as the emotional climate displayed in the parent-child interaction, and refers to all communication, verbal and silent, directed from the parent to the child. Parenting styles are argued to reflect the underlying processes of a parent's *responsiveness* and *demands* and are commonly sorted under four categories: *authoritative*, *authoritarian*, *indulgent*, and *uninvolved*. *Authoritative* parents are high on responsiveness and supportiveness, and parents set clear boundaries and expectations for the child. *Authoritarian* parenting is recognized by high levels of demand and low responsiveness to the child's individuality. *Indulgent* parents have low demands and boundaries, with high responsiveness to the child's requests. Finally, the *uninvolved* parenting style refers to parents who are low on both demand and responses to the child's needs (51). Systematic reviews point toward the *authoritative* parenting style being most protective to children's healthy lifestyle and weight development, whereas *authoritarian*, *uninvolved*, or *indulgent* parents more often have children with unhealthy behaviours and weight development (52-54).

Parenting practices, as a complement to parenting styles, are parental activities intended to affect children's specific behaviours (54). In addition to general parenting styles, specific parental feeding practices [PFP] are described as strategies that parents use to influence their children's food consumption (55). On the one hand, *positive* PFPs are argued to be beneficial for child development and include parents' behaviours aimed at promoting healthy and empowering food experiences for their children. Examples of *positive* PFPs are monitoring consumption, role modelling healthy eating, structured meal routines, encouragement of child autonomy, and providing a healthy food environment. On the other hand, *negative* PFPs are viewed as harmful for child development and include coercive strategies to dominate the child in situations around food. Examples of *negative* PFPs parents use to affect children's food intake include pressuring the child to eat, using food as a reward or punishment, lack of involvement, and stringent restrictions and limiting of foods (56).

In association with child weight development, recent systematic reviews have concluded that *negative* PFPs (e.g., *pressure to eat* and *restriction*) could be associated with the risk of unhealthy weight development in children (54, 57, 58). On the other hand, available knowledge regarding *positive* PFPs in relation to child weight development is lacking. However, some *positive* PFPs, such as providing a healthy environment, role modelling, and encouraging a balanced food consumption, have been associated with improved healthy food behaviours in preschool children (59, 60) and parental role modelling and logistic support are argued to be important for increased child physical activity (61). Moreover, what to consider effective and *positive* PFPs might change as the young child grows older and more independent. Younger children (<5 yrs.) are mostly affected by their home environment and need support from responsive parents in a healthy structure around food and mealtime. School-aged children are exposed to a much wider range of structures regarding food and often make food purchases more independently. Here, parents need to adapt their PFPs from the younger childhood years, providing appropriate structures and expectations for sustaining

healthy eating behaviours (56). Although there seems to be a clear age gradient in how PFPs are related to child eating and development, most research has focused on evaluating PFPs during infancy and early childhood, and there is a lack of knowledge regarding how parents of school-aged children use specific PFPs. School nurses meeting with families would be helped in their daily work by knowledge about parenting practices important for children’s healthy behaviours, thus enabling them to promote *positive* parenting practices.

2.3 HEALTH PROMOTION

Health promotion and disease prevention are related yet distinct concepts on the continuum of public health interventions (**Figure 2**). Health promotion is defined by the World Health Organization (62) as “...the process of enabling people to increase control over, and to improve their health” (p. 1) by strengthening individuals skills and capability for increased control over the determinants of health. Disease prevention on the other hand can be categorized into three overarching levels of preventive actions: primary, secondary, and tertiary. Primary prevention refers to actions for preventing the onset of a condition, e.g., through reducing known risk factors such as unhealthy diets or inadequate physical activity. Secondary prevention includes early detection and halting progression of diseases through screening programmes for known risk groups. Tertiary prevention refers to actions to minimize the harm and suffering caused by diseases and to prevent relapse (62).

Health promotion and primary prevention are often universal interventions targeting whole populations, whereas interventions for secondary and tertiary prevention are selective, focusing on known risk groups and specific patient groups respectively (63). As a development of the Alma Ata declaration, which emanated from a conference on the importance of primary health care (64), the Ottawa Charter of Health Promotion was published in 1986, emphasizing the importance of public health efforts reaching beyond what is traditionally considered the health care sector. Moreover, health promoting interventions should primarily focus on enabling individuals to make healthy choices through incorporating health in all policies, supporting health promoting environments and facilitating personal skills development in the populations (65). The World Health Organization advocates a whole-system approach to counteract childhood obesity and accentuates the importance of a health promotion approach including healthy school environments and provision of health guidance for families (66, 67). The importance of a robust system such as regular monitoring

	Health promotion	Disease prevention		
		Primary	Secondary	Tertiary
Target	Universal	Universal	Selective	Specified
Definition	Strengthen individuals' capability and control	Reducing risk factors to prevent first incidence	Early detection and halting of disease progression	Minimize harm and prevent relapse

Figure 2. Health promotion and disease prevention spectrum, based on WHO definitions for health promotion (2).

of children’s health and growth for early detection of risk factors, and support for parents regarding healthy lifestyle behaviours, is also emphasized (25, 68).

2.3.1 Nurses’ role in child health promotion

One of the fundamental responsibilities mentioned in the international Ethical Code for nurses is to promote health and prevent disease in the population (69). In Sweden, nurses – together with physicians – are central actors in health promotion and primary prevention for children. They work in different sectors throughout the continuum of child health care (**Figure 3**), providing services free of charge to the entire population – from maternity care to graduation from compulsory school (6). After birth, and until the child enrolls in primary school, child health services have the responsibility to tend to families, promoting children’s health and well-being. Here, specialized nurses act as team leaders, managing universal interventions predominantly focusing on health monitoring and immunizations, as well as targeted interventions aimed at strengthening known protective factors for children’s healthy development regarding e.g. food and physical activity, through a family-centred approach (2, 70). Furthermore, the understanding and application of *person-centred care* is fundamental in caring science and nursing practice. When applying *person-centred care*, nurses are expected to adopt a holistic approach and apply interpersonal skills that derive from the constructs of person-centredness e.g., empathy, respect, engagement, relationship, and communication (71-73). Furthermore, *person-centred care* is considered one of the six core competences for school nurses alongside, e.g., *evidence-based practices*, and *care quality improvement* (72, 74). School nurses working with health promotion targeting parents and young children can apply concepts from both child-centred care and family-centred care, as their efforts focus on the family unit with children’s best interest in mind (75).

2.3.1.1 School nursing

When children enrol in primary school in Sweden, as a continuation of the child health services (**Figure 3**), school nurses and physicians take over responsibility for following the children’s health development throughout the school years (6). All children in Sweden are legally entitled to school health services, including medical, pedagogical, social, and psychological efforts. It is stated that school health services should promote health with a primary focus on supporting children’s educational achievements (76). Moreover, all children are provided nutritious school lunches, free of charge, with the potential to promote equality in health over the life course (77).



Figure 3. Continuum of units responsible for child health promotion in the Swedish health system (3).

School nurses are considered the cornerstones of the medical school health services (6) and a dominant segment of their work is to conduct regular health assessments and to implement the national immunizations programme. The primary purpose of the health assessment is to monitor children's growth and development, and screen for known risk factors that could interfere with educational outcomes and health development. In addition to the physical assessments, individual health promoting conversations are scheduled with the school nurse approximately every three to four years throughout compulsory school. Importantly, the first visit at school start often includes the parents. These regular one-to-one health visits with children and parents provide extraordinary opportunities for school nurses to reach all families with health promoting activities (78).

School nurses have been identified as playing an important role in health promotion and the global fight against childhood obesity (79) and health promoting conversations with children and parents, in addition to the physical examinations, constitute a major part of school nurses' health promotional work (78). A systematic review explored how parents prefer the health care system to communicate around children's weight development and health. Conclusions were that parents are aware that growth screenings are done regularly in schools and want to be informed about the process. Parents find it important to have the information regarding their child delivered in a sensitive way and with a person-centred approach. Moreover, parents sometimes feel insecure regarding how to manage their child's weight development and want to be able to discuss with health professionals or have accessible information on strategies on how to handle it (80). In the Swedish context today, health promoting conversations are often facilitated by health surveys filled in prior to the visits, focusing on health behaviours and attitudes. While older children frequently participate in the conversations without parent or guardian, younger children often come together with their parents or guardians. The regular health visits provide school nurses with opportunities to promote healthy behaviours and stimulate behavioural change in families (78). Nonetheless, research shows that nurses meeting with parents in health promoting situations find conversations with parents regarding children's weight status and lifestyle behaviours difficult to approach because of the sensitive nature of the topic (81-84) possibly leading to the issue never being raised (85). Perceived barriers for nurses to discuss children's weight with parents include insufficient knowledge and confidence in their ability to support families, parents lacking motivation, lack of time, and fear of harming their relationship with parents and the child (86). Moreover, research suggests that school nurses in general display inadequate skills for supporting families of children with overweight (87). Although the national guidelines state that the health promoting conversations should apply a person-centred approach and include motivational elements (78), to date, evidence-based work procedures to help school nurses in structuring and facilitating these mandatory health promoting conversations are lacking.

2.3.2 Motivating healthy behaviours

The person-centred conversational style *Motivational Interviewing* (MI) was developed by psychologists William Miller and Stephen Rollnick and is meant to be used by clinicians to facilitate clients' moving from ambivalence toward change in lifestyle behaviours. The specific conversational techniques of MI include exploring clients' goals, current behaviours, and reasons for change, in an empathetic and non-confrontational manner, encouraging clients' perception of self-efficacy (88). The founders of the method argue that all conversational styles can be placed on a sliding scale, stretching from the instructive and advisory *directing style* at one end, to the passive and submissive *following style* at the other. MI falls somewhere in the middle, and is classified as a *guiding style* of conversation, with clinicians displaying conversational skills with four main qualities, i.e., partnership, acceptance, compassion and evocation – also known as the spirit of MI (88).

When applied in clinical practice, the method of MI is explained as encompassing four overlapping processes for clinicians to consider, schematically represented as a staircase model. On the bottom step, the process of *engaging* is laid out as a foundation, emphasizing trusting relationships and working alliance with the client. In the *focusing* process, clinician and client working together, decide a direction for the conversation by formulating possible targets for behaviour change. Subsequently, in the *evoking* process, clinicians should try to harness the client's own viewpoint and motivation for change, rather than providing the client with a diagnosis and set solutions. Finally, when the client is ready to change a behaviour, clinicians can guide and elicit the client's solutions in the *planning* process. At this stage, clients often visualize the change and seek information on how to proceed (88).

2.3.2.1 Mechanisms of Motivational Interviewing

The theoretical foundation of MI is based on practitioner's active use of a combination of global MI specific relational and technical skills (89). The *relational* skills refer to the practitioner's demonstration of inter-relational qualities such as authentic empathy and sense of partnership. The *technical* skills comprise practitioner's use of MI specific techniques to encourage client's expressing positive ideas about changed behaviours (change talk) as well as to discourage client's resistance for change and favouring of present behaviours (sustain talk). High levels of change talk and low levels of sustain talk are theorized to result in positive outcomes (89). The mechanisms of MI were described by Frey et al. (90), who suggest that higher scores for MI practitioners on technical and relational MI skills and better adherence to the principles of MI are associated with clients engaging in change talk and thus more likely to change an unwanted behaviour (90).

2.3.2.2 Is Motivational Interviewing effective?

To understand the effect of MI interventions, it is necessary to measure to what extent the intended MI actually was delivered (91). The *Motivational Interviewing Treatment Integrity Coding Manual* [MITI] was developed as a coding system for assessing a clinician's fidelity to the method when applying MI with clients or in research (92). In the most recently updated

manual (MITI 4), coders weigh global scores on relational (partnership and empathy) and technical components (cultivating change talk and softening sustain talk) together with clinician's behavioural counts on specific measures, e.g., adherent and non-adherent MI-behaviours, as well as questions and reflections. Subsequently, summary and ratio scores are computed, together indicating the clinician's competence level related to suggested thresholds (91, 93). Several studies have reported satisfactory inter-rater reliability scores when applying the MITI 4 coding system (92, 94, 95), suggesting that the method is a reliable tool for assessing MI competence (96). Nonetheless, researchers argue that fidelity to MI is underreported in intervention research (91).

When it comes to the effect of MI on behavioural change among adults, a vast amount of research has been published over the years. A recent umbrella review highlights that many published studies lack information on the amount of training counsellors have received and/or their fidelity to MI, thus calling into question the reliability of claims that the MI intervention was actually effective or not. Nonetheless, the available evidence indicates that MI has a positive effect when it comes to supporting adults in changing unhealthy behaviours such as smoking, alcohol consumption and physical activity (97). Regarding using MI with parents as a way to effectuate young children's healthy lifestyle, the research is not as extensive as for behaviours in adult populations. Nonetheless, systematic reviews imply that MI, when targeting parents, has the potential to change health-related behaviours in children such as diet, screen time, physical activity and oral health (98, 99). One large study conducted in Swedish child health care, aimed at obesity prevention through MI with parents, reported no effects on BMI or physical activity, and only small effects on self-reported food intake. However, the study reported no measures of changes in parenting practices (100). In contrast, a recent study focusing on improving dental health in children through brief MI sessions with parents, and which showed high fidelity to MI, showed significant results favouring the intervention groups. This study used oral health status as well as parenting practices as outcome measures (101).

Studies have shown that MI can be a difficult technique for clinicians to learn and uphold over time (102), suggesting high levels of both between- and within-provider differences (103). Nonetheless, nurses meeting families at child health centres seem to find MI feasible to apply, and the method is also perceived as coherent with nurses' norms and values (104). However, school nurses might find it challenging to apply MI when parents and children are at different stages of motivation, or when parents give the child responsibility for managing their own weight concerns (105).

2.4 RATIONALE FOR THESIS

In general, school aged children in Sweden are in good health. Nonetheless, considerable social inequalities in health and development persist (28). Behaviours established during childhood often track into adolescence and adult life, where an unhealthy weight development can lead to non-communicable diseases over the life course. Parents are key actors for promoting children's healthy food and physical activity behaviours in the home environment. However, parents need support in establishing parenting practices appropriate for changing or sustaining children's health-related behaviours. Health promoting activities have the capacity to strengthen people's health knowledge, motivation, and resilience. School nurses in Sweden conduct systematic and regular health visits throughout the compulsory school years that often include health promoting conversations with both children and parents. Therefore, school nurses need evidence-based guidance to facilitate health promoting conversations and provide person-centred support for families.

3 RESEARCH AIMS

The overall aims of this doctoral thesis were to evaluate school nurses' MI performance and potential to positively influence child behaviour through health promoting conversations with parents, as well as to explore school nurses' and parents' experiences of delivering and participating in MI sessions.

3.1 SPECIFIC AIMS

The aim of the **first** study was to:

- Explore parents' thoughts regarding their normal-weight children's food and physical activity behaviors as expressed during health conversations with the school nurse

The aim of the **second** study was to:

- Investigate if parents' feeding practices differ in relation to child weight status

The aim of the **third** study was to:

- Explore if objective ratings of school nurses' MI quality was associated with change in children's food intake and physical activity

The aims of the **fourth** study were to:

- Explore how objective ratings of school nurses' MI quality correlate with the subjective quality ratings from school nurses and parents,
- Understand school nurses' and parents' perceptions of delivering and participating in the MI sessions,
- Illustrate how objective and subjective ratings of the MI sessions resonate with school nurses' and parents' perceptions of the same MI sessions.

4 MATERIALS AND METHODS

4.1 OVERVIEW OF STUDY DESIGNS

This doctoral thesis includes four separate studies with different methodological approaches (**Table 1**). In the first study [**Study I**] a qualitative explorative inductive design was used. For the second study [**Study II**] and the fourth study [**Study IV**] quantitative methods were used, whereas for the third study [**Study III**] a mixed-methods design was used. In addition, this thesis includes unpublished findings from independent samples t-tests regarding children's food and activity behaviours in relation to baseline adherence to recommended behaviours [**Additional findings A**] as well as school nurses' objectively rated MI competence before and after MI training [**Additional findings B**].

Table 1. Overview of design, data and analyses of studies included in this thesis.

Study	Focus	Design	Participants	Data	Analysis
I	Parents' thoughts regarding children's health-related behaviours	Qualitative	Parents ($n = 32$) from the HSSP intervention schools	Audio-recorded health conversations	Qualitative content analysis
II	Parents' feeding practices and child weight status	Cross-sectional	Parents ($n = 241$) from the HSSP intervention and control schools	Survey data	Analysis of mean variance
III	Ratings and perceptions of participating in and delivering MI	Mixed methods	Families ($n = 97$) and school nurses ($n = 7$) from the HSSP intervention schools	Objective MITI ratings Subjective MI ratings Interviews	Spearman's correlation Qualitative content analysis Integrated joint display
IV	Associations between MI competence and change in children's behaviours	Before–after uncontrolled	Families ($n = 97$) and school nurses ($n = 7$) from the HSSP intervention schools	Objective MITI ratings Child food intake Accelerometry	Linear regression
A	Change in children's behaviours after intervention considering baseline behaviours	Before–after uncontrolled	Children ($n = 97$) from the HSSP intervention schools	Child food intake Accelerometry	Paired samples t-test
B	Change in school nurses' MI competence after MI training	Before–after controlled	School nurses ($n = 16$) from HSSP intervention and control schools	Objective MITI ratings	Paired samples t-test

Note: MI = Motivational Interviewing; HSSP = The A Healthy School Start Plus trial; MITI = Motivational Interviewing Treatment Integrity (93)
A & B = additional unpublished findings

4.2 STUDY SETTING

This thesis is based on data from the A Healthy School Start Plus [HSSP] trial (106), which was the third round of evaluation of the *A Healthy School Start* [HSS] programme. The original HSS was designed in 2010 at Karolinska Institutet as a school-based programme, specifically developed for low-income areas in Sweden, with the intention to promote healthy behaviours in families, potentially preventing the development of childhood overweight and obesity.

HSS has previously been evaluated in two rounds of cluster-randomized trials (107, 108). The first evaluations showed that children consumed more vegetables after participating in intervention as compared to children in control schools, and that girls in intervention schools were more physically active during weekends than girls in control schools (107). The second evaluation showed that children from intervention schools had lower intake of unhealthy foods and drinks as compared to children in control schools (108). Furthermore, interviewed parents described the HSS programme as a motivation for focusing on children’s behaviours. Nonetheless, some parents reported practical and intrapersonal barriers to engaging in the programme or sustaining newly developed behaviours (49, 109-111). Conclusions from HSS evaluations were that future programmes should focus more on parenting practices rather than only providing health information. During the initial two HSS trials (107, 108), external expert counsellors performed the MI component. In the HSSP (106), a fourth component was added – the type-2 diabetes risk test for parents – and all intervention components were delivered by the local school staff (i.e., school nurses and teachers).

HSSP was carried out in primary schools in disadvantaged areas in and around Stockholm, Sweden from November 2017 to April 2018 as a universal intervention targeting parents and children with the aim to promote healthy dietary and physical activity behaviours and prevent child overweight and obesity (**Figure 4**). All methodological details are described in the published study protocol (106) and briefly below.

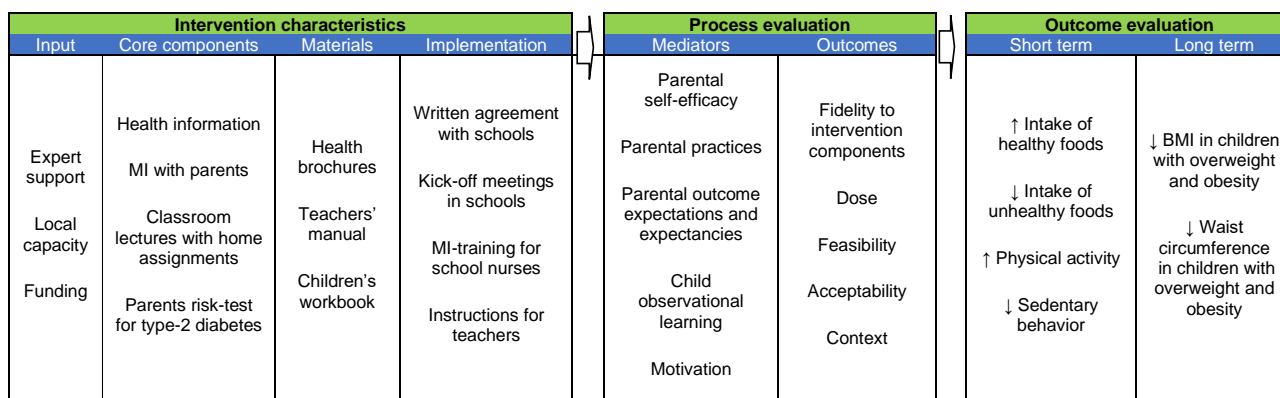


Figure 4. Conceptual model of the Healthy School Start Plus trial

The HSSP intervention included four components: 1) Motivational Interviewing with parents (child not present) focusing on health promotion via dietary and physical activity behaviours as a complement to the regular health visit during the first school year. Prior to the start of the intervention school nurses had received MI training (see section 4.2.1). School nurses also received education and printed material regarding positive parenting practices and were advised to focus the conversations on parenting practices related to the area of interest chosen by the parent. The MI sessions were scheduled by the school nurse and held at the school nurse's office at the respective school; 2) nine classroom lectures delivered by teachers to children with home assignments to be performed together with parents; 3) a 24-page brochure with information about a healthy diet, physical activity and effective parenting practices to parents in easy Swedish, English and Arabic; and 4) an online diabetes type 2 risk test for parents (FINDRISC) (112). Control schools only received a health brochure (HSSP component 3), and control families were invited to the regular health visits to the school nurse with procedures as usual. These visits included age specific assessments regarding child physical health and development, health related behaviours, school related well-being, and immunizations (78).

Measurements were carried out at baseline [T0] September–October 2017, and directly after the end of intervention, approximately 8 months post baseline, in April–May 2018 [T1]. In total 49 schools were invited to participate in HSSP trial, of which 17 schools agreed to be included in the study. Randomization was done at school level and the schools were randomly assigned to either the intervention (n = 8) or the control (n = 9) group. In the end, families of 353 children (aged 5–7 years) agreed to participate in the HSSP trial; 152 children (75 girls) in the intervention group and 193 children (98 girls) in control schools. One school nurse dropped out after randomization and MI training due to health issues. Therefore, to suit the overall aim, this thesis used data from the seven intervention schools where school nurses had conducted the MI sessions with parents.

A report on the HSSP intervention's effects has been submitted for publication (113, 114). Findings were that children in the intervention families consumed significantly lower amounts of sweet beverages and higher amounts of fruits and vegetables after the intervention, as compared with children in control schools (114).

4.2.1 Motivational interviewing training for school nurses

Prior to the HSSP launch, all intervention school nurses participated in a two-day MI workshop with trainers who are members of the Motivational Interviewing Network of Trainers [MINT]. The training included lectures, demonstrations, and practical exercises specifically tailored for the health promoting school context. The workshop training was then followed by supervision on two occasions. Both supervision sessions consisted of feedback based on monitoring of practice. The school nurses recorded two MI practice sessions. One was transcribed by the school nurse, analysed, and discussed during a group supervision session. The other recording was coded by experts using the MITI coding system (93), and written and oral feedback was given during the individual supervision session. In addition to

MI theory, the nurses at intervention schools received lectures focusing on the state of knowledge concerning children's healthy behaviours and parenting practices in relation to food and physical activity. During the intervention, all school nurses had access to all written information given during the training, they received supervision based on additional audio-recorded MI sessions (median=2), and had the possibility to reach out to MINT experts for additional guidance (106).

4.2.1.1 MI competence after training

All school nurses (both from intervention and control schools) were asked about their previous MI experience and education. Nurses' MI competence was objectively assessed on three occasions: baseline, post-MI-training, and post intervention. This was done by audio-recorded telephone-based sessions with a standardized client (performed by an experienced actor) posing as a parent to a school aged child. All intervention nurses ($n = 7$) and most control nurses ($n = 9$) completed all standardized sessions. The sessions were coded by experts using the MITI coding system (93). Paired samples t-test with 2-tailed significance levels of 95% was used to compare mean differences of intervention school nurses' MI competence as measured before and after MI training, contrasted with control nurses MI competence measured at similar time points (**Additional findings B**).

4.3 PARENTS' THOUGHTS REGARDING CHILDREN'S HEALTH RELATED BEHAVIOURS (STUDY I)

The aim of the study was to explore parents' thoughts regarding their normal weight children's food and physical activity behaviours as expressed during health conversations with the school nurses as part of the HSSP trial (106). This study applied a qualitative explorative inductive study design (115) using sampled data with a maximum variation from the seven intervention schools.

4.3.1 Material

4.3.1.1 Real-life health conversations

This study used real-life audio-recorded health conversations delivered by intervention school nurses with parents participating in the HSSP trial (106). Health conversations as part of HSSP were conducted at the school nurse's office at the respective schools. All intervention conversations ($N=111$) were audio-recorded by the school nurse and uploaded to a secure web-based server. The sample used for this study comprised 30 conversations selected from a subset of parents of children with normal weight ($n=62$) as defined by an international standard (116). The sample was selected to obtain maximum variation (115) regarding the parent's sex, region of birth, and education, the child's sex, and the school's area. The parents' chosen focus for the conversation also needed to be suitable for the aim, i.e., concerning food ($n=15$) and physical activity ($n=15$). Most conversations were in Swedish ($n=26$), although four conversations went through a professional interpreter present in the

room or via telephone. The length of the sampled conversations ranged between 8 and 39 min with a mean of 18 min.

4.3.2 Analysis

4.3.2.1 Qualitative content analysis

The audio recordings were transcribed verbatim and subjected to inductive qualitative content analysis as described by Elo and Kyngäs (117). Initially, all co-authors independently read through the same three transcripts and indicated meaning units relevant for the research aim. These were compared in a systematic way to assess the level of abstraction across researchers. Similarities and differences were discussed. Next, all transcripts were read through several times, and relevant sections in the transcripts were highlighted through open coding. During written and oral discussions, the data were sorted and grouped under higher headings based on similarities, and by going back and forth between transcripts and codes, preliminary generic categories were formed. The procedure was repeated until the full sample was incorporated and the final categories were agreed. To ensure trustworthiness of the results, authentic, anonymised quotes from the conversations were used to exemplify the categories.

4.4 FEEDING PRACTICES AND CHILD WEIGHT STATUS (STUDY II)

This study aimed to explore differences in the parental feeding practices of parents whose children were of normal weight and parents of children with either established overweight or obesity. This cross-sectional study used baseline data from schools in the HSSP trial (106).

4.4.1 Material

Baseline data from all participating HSSP schools (both intervention and control clusters) were used for this study. Parents of children with complete data regarding children's age, weight, and height, and who had completed the questionnaire regarding PFP were included.

4.4.1.1 Parents' feeding practices

Parents responded to a web-based Swedish translation of the Comprehensive Feeding Practices Questionnaire [CPFQ] (118) that included ten of the original CFPQ constructs (**Study II, Table 1**): Modelling (e.g., *"I try to eat healthy foods in front of my child, even if they are not my favourite"*), Monitoring (e.g., *"How much do you keep track of the sweets (candy, ice cream, cake, pies, pastries) that your child eats?"*), Environment (e.g., *"A variety of healthy foods are available to my child at each meal served at home"*), Involvement (e.g., *"I involve my child in planning family meals"*), Encourage balance and variety (e.g., *"I encourage my child to eat a variety of foods"*), Emotion regulation (e.g., *"Do you give this child something to eat or drink if s/he is upset even if you think s/he is not hungry?"*), Restriction for health (e.g., *"If I did not guide or regulate my child's eating, s/he would eat too much of his/her favourite foods"*), Restriction for weight control (e.g., *"If my child eats more than usual at one meal, I try to restrict his/her eating at the next meal"*), Food as a

reward (e.g., “*I withhold sweets/dessert from my child in response to bad behaviour*”), and Pressure to eat (e.g., “*My child should always eat all of the food on his/her plate*”) (118). The construct Restrictions for weight control was reduced to include three out of six original CFPQ items, and the constructs Teaching nutrition, and Child control were excluded.

The original CFPQ items (118) were translated from Swedish and back translated to English by two senior researchers fluent in both English and Swedish, and with profound experience in research concerning parenting practices. All items were responded to on a five-point response scale (ranging from 1=never/disagree to 5=always/agree). The mean value for each construct was calculated and used as the dependent variable. Cronbach’s Alpha (α) was used to assess internal consistency for the factors (range from 0.38 to 0.95). Five of the constructs did not reach acceptable levels ($\alpha > 0.7$) of internal consistency (**Study II, Table 1**).

4.4.1.2 Children’s anthropometric measurements

The children’s BMI was used as a grouping variable for analyses of covariance. Children’s height (millimetres) and weight (grammes) were measured by the research team with standardized procedures (106). Age-standardized body mass index [BMI-sds] was calculated based on a Swedish standard (119) and categorized according to international standards (120).

4.4.1.3 Covariates

Parents reported information regarding their own sex, level of education, and region of birth. All covariates were used as dichotomized variables. Level of education represented the highest formal education, where ≥ 12 years was the cut-off for higher-level education. Region of birth was based on if the parent was born in one of the Nordic countries i.e., Sweden, Norway, Denmark, Finland, and Iceland. Child sex was registered at baseline.

4.4.2 Analysis

4.4.2.1 Analysis of covariance

First, variance in mean values of PFP between child weight groups was assessed with a univariate general linear model without covariates, i.e., a one-way analysis of variance [ANOVA]. Then, covariates were added to the model, i.e., analysis of covariance [ANCOVA]. Child weight status was used as independent grouping variable. Mean scores were calculated for each of the ten PFP constructs and used as dependent variables. Sub-group analyses were performed by first examining interaction terms (with the grouping variable (child weight) and covariates) as main effect for each of the PFPs. In models where the interaction term was found significant, sub-group analyses were performed to detect underlying sub-group effects. All analyses were performed with the software IBM SPSS Statistics version 27 (121).

4.5 RATINGS AND PERCEPTIONS OF SCHOOL NURSE MI COMPETENCE (STUDY III)

The aim of this study was to explore correlations between school nurses' MI competence as assessed by MITI coders using quantitative objective ratings and as assessed by parents and school nurses using subjective ratings. In addition, the study explored qualitative perceptions of delivering and participating in MI sessions as reported by school nurses and parents within the HSSP trial (106). This study applied a convergent mixed-methods study design (QUAL+QUANT) using both qualitative interview questions and quantitative tools in the data collection (122).

4.5.1 Material

4.5.1.1 Objective ratings of the school nurses' MI competence

During the HSSP, all MI sessions delivered by the school nurses were audio-recorded and uploaded to a secure web-based server. All intervention school nurses (n=7) were provided with audio recorders and recorded all MI conversations at their regular office. Audio-recorded MI sessions were then assessed using the MITI 4 coding manual (93) to measure school nurses fidelity to the method. The MITI coding system focuses on practitioners' verbal responses in MI conversations and includes both global scores and counts of micro skills. The MI conversations ranged from 2.3 min to 39.1 min (mean = 18.1 min). Four global ratings are used in MITI to capture MI spirit:

cultivating change talk; softening sustain talk; partnership; and empathy. Moreover, MITI refers to *cultivating change talk* and *softening sustain talk* as the technical skills, whereas *partnership* and *empathy* are referred to as the relational skills. Each global score is coded using a 5-point Likert scale with a minimum of 1 and a maximum of 5. Conversations shorter than 10 minutes should only be assigned global scores when deemed appropriate (93), leaving a total of 8 MI conversations from the HSSP without global scores. All conversations were coded for MITI-defined behavioural counts (micro skills), which are ten frequency measures of practitioner behaviours: *affirmations, seeking collaboration, emphasizing autonomy, persuading, confronting, giving information, persuading with permission, simple reflection, complex reflection, and*

Table 2. Inter-rater reliability for MITI estimated by intra-class correlation [ICC].

MITI scores	ICC	CI range (95%)
Technical	.669	.375 to .850
Cultivate change talk	.663	.376 to .835
Softening sustain talk	.478	.105 to .732
Relational	.741	.500 to .876
Partnership	.730	.483 to .871
Empathy	.658	.365 to .833
MIA	.610	.215 to .819
Affirmations	.714	.442 to .864
Seek collaboration	.579	.209 to .796
Emphasize autonomy	n/a	n/a
MINA	.865	.721 to .938
Persuade	.851	.691 to .932
Confront	.872	.726 to .942
%CR	.346	-.011 to .637
Complex reflections	.566	.125 to .801
Simple reflections	.733	.482 to .873
R:Q	.529	.133 to .770
Questions (total)	.845	.638 to .933
Reflections (total)	.783	.430 to .912
Give information	.795	.591 to .904

MIA: MI Adherent behaviours
MINA: MI Non-Adherent behaviours
%CR: Percent Complex Reflections
R:Q: Reflections to Questions ratio

asking questions. Too few conversations contained *confronting* (n=3) and this score could therefore not be used in analyses. Other commonly reported scores are the *reflection-to-question-ratio* [R:Q] score (sum of reflections divided by total questions), and *percent of complex reflection* score (complex reflections divided by sum of simple and complex reflections). Suggested thresholds in MITI for basic MI proficiency are: technical ≥ 3.0 ; relational ≥ 3.5 ; %CR $\geq 40\%$; R:Q ≥ 1.0 (93). Furthermore, the measure percent of *complex reflection* (range 0-60%) was divided into five interval categories (1= 0% 2= $\leq 20\%$ 3= 21-30% 4= 31-40% 5= $\geq 41\%$), based on cut-offs in the MITI manual (93). This interval variable was treated as a continuous variable in the linear regression analyses.

MITI coding was carried out by two coders at the Motivational Interviewing Quality Assurance [MIQA] coding lab at Karolinska Institutet, Sweden. Inter-rater reliability [IRR] for the two MITI coders was based on 25 randomly selected audio recorded MI conversations from the HSSP trial. A total of 20 MITI measures were compared for every conversation. Intraclass correlation coefficient [ICC] with a two-ways mixed model and absolute agreement was applied (96). ICC single measures ranged between 0.48 and 0.87 (**Table 2**), where scores above 0.60 were considered good, and above 0.75 excellent measures for IRR (123). Five measures (*softening sustain talk*, *seeking collaboration*, *simple reflections*, %CR and R:Q) scored below 0.60. No ICC could be calculated with accuracy for the micro skill *emphasizing autonomy*, as it was too rare, occurring only six times.

4.5.1.2 School nurses' ratings of their MI competence

All MI sessions within the HSSP trial (106) were self-rated by the school nurses, who filled in a log directly after the MI sessions. Two of the self-rated variables focused on the global MITI measures: ability to *Cultivate change talk* and show *Empathy*. The two questions were 1) *In this conversation I demonstrated an effort to encourage the parent to talk about benefits of creating or sustaining healthy food and physical activity behaviours for the child*, and 2) *In this conversation I demonstrated an effort to understand the parents' thoughts and feelings*. These questions were rated on a five-point Likert scale, ranging from 1="Very little" to 5="Very much". The third questions answered by the school nurses focused on the perceived *reflection-to-question-ratio* in the MI session, i.e., 3) *In this conversation the proportion of reflections in relation to questions was as follows*. This question had three possible ratings: 1="More questions than reflections"; 2="Equal number of questions and reflections"; 3="More reflections than questions".

4.5.1.3 Parents' ratings of the school nurses' MI competence

Directly after meeting with the school nurse, parents were asked two questions regarding the MI session derived from the web-based *Clinical Experience Questionnaire* (124). The questions were 1) *Did you feel that the school nurse demonstrated an effort to understand your thoughts and feelings?* and 2) *Did the school nurse motivate you to create or sustain healthy food and physical activity behaviours for your child?* The parents were asked to answer the questions on a five-point Likert scale, ranging from 1="Very little" to 5="Very

much”. In two cases, both parents attended and rated the same MI session, and their average rating was used to reflect the parents’ experience.

4.5.1.4 *School nurses’ experiences of delivering MI*

All participating school nurses (n=7) from the HSSP trial were interviewed face-to-face (n=6) at a location suitable for the interviewee, or at the specific request of the school nurse, by telephone (n=1). The interviews were conducted by an experienced qualitative researcher who used a semi-structured interview guide. All interviews were audio-recorded and transcribed verbatim by a transcription service. Examples of questions that were posed during the interviews were: “*How did you perceive using MI with the parents?*”, “*What was your previous experience using MI?*”, and “*How did you perceive that MI might have influenced parents’ and children’s behaviours?*”

4.5.1.5 *Parents’ experiences of participating in MI*

A purposeful sample of parents (n=17) from the intervention schools that had participated in the MI session were interviewed over telephone using a semi-structured interview guide. The sample was selected to achieve maximum variation (115) regarding parent sex and country of birth as well as child sex and weight status. A female doctoral student performed the sampling, contacted the eligible parents, and conducted all interviews. All interviews were audio-recorded and transcribed by a transcription service. Examples of questions posed: “*How did you experience the conversation with the school nurse?*”, “*How did you experience the school nurse’s approach and attitude?*” and “*How did the conversation with the school nurse affect your family?*”

4.5.2 **Analyses**

4.5.2.1 *Spearman Correlation*

Spearman correlation coefficient (ρ) with a two-tailed significance level of 0.05 (95%) was used to assess correlations between the objective and subjective ratings of the MI sessions. The software used was IBM SPSS Statistics version 27 (121). **First**, the MITI rating for *cultivating change talk* was correlated with the corresponding questions answered by school nurses and parents. Then school nurses’ and parents’ answers were tested for correlations. **Secondly**, the MITI rating for *empathy* was tested against ratings from school nurses and parents. Then school nurses’ and parents’ answers were tested for correlations. **Lastly**, the MITI rating for *reflections-to-questions ratio* was tested for correlations in relation to the corresponding answer from school nurses.

4.5.2.2 *Qualitative content analysis*

The interviews were analysed by qualitative content analysis with an inductive and manifest approach as described by Elo & Kyngäs (117). Transcripts were imported into the software NVivo 12 Plus (125). Initially, interviews with school nurses and parents were analysed as two separate domains. All transcripts were read through several times and wordings

corresponding to the study aim were marked and labelled, producing codes. The codes were read through several times and then sorted into groups with codes belonging together forming subcategories. Secondly, subcategories were investigated and grouped into an emerging pattern of hierarchical structured categories. Finally, the two separate domains were collapsed, with related subcategories from both domains merged under mutual generic categories. The qualitative analysis was an organic process with the authors working together, discussing, and revising formulations of categories throughout the process. All transcripts from parents' and school nurses' interviews were read and coded by two authors. To further ensure credibility of the analysis, two of the co-authors coded one transcript from each domain. Similarities and differences were discussed through peer-debriefing. Further, results were presented with constant references to the raw data for quotes from both domains (parent or school nurse) to illustrate emerging subcategories and categories. All co-authors read and approved the texts and phrasings of the final results (115, 126).

4.5.2.3 Integrated mixed-methods analysis

After the qualitative and quantitative data had been analysed as described above, the findings were merged by comparing statistical findings with qualitative findings (127). This was accomplished through close collaboration where two of the authors discussed the essence of the qualitative and quantitative findings, and then merged these into a joint display of findings. The proposed display was reviewed by the other two authors and the final version of the display was approved by all authors. The integrated results were presented in a joint display to expand the understanding and to illustrate how objective and subjective ratings of the MI sessions resonated with school nurses' and parents' perceptions of the conversations (128).

4.6 MI COMPETENCE IN RELATION TO CHANGED BEHAVIOURS (STUDY IV)

This study aimed to explore the association between school nurses' MI competence in conversations with parents and change in children's dietary and physical activity behaviours. We also wanted to investigate if the child's adherence to recommended behaviours at baseline was of importance for behaviour change. This study applied a before–after uncontrolled study design and data were obtained from seven of the intervention schools that were part of the HSSP trial (106). Out of the 152 intervention families in HSSP, a total of 111 families participated in MI conversations with the school nurse. MITI scores derived from 97 of the MI sessions, after excluding conversations conducted via interpreter ($n = 12$) and late withdrawals ($n = 2$).

4.6.1 Material

4.6.1.1 Objective ratings of the school nurses' MI competence

Objective measures of school nurses' fidelity to Motivational Interviewing were used in two of the scientific papers included in this thesis. More information regarding data generation can be found in section 4.5.1.1.

4.6.1.2 *Children's physical activity*

Physical activity was measured with a waist-worn accelerometer (GT3X+, Actigraph) for seven consecutive days, which is considered a valid and reliable objective method for measuring children's physical activity (129). MVPA was defined as activity above 2296 cpm (130). Measures used in this study were children's average MVPA measured in minutes per day, during weekdays and weekends. As this study explores the association of MI skills and children's behaviours in the home environment, only MVPA during non-school hours was used to assess behaviour change during weekdays, excluding measures between 08.00 and 16.00.

4.6.1.3 *Children's dietary intake*

Information regarding children's dietary intake was collected through a photo-based method that was developed specifically for the HSSP. Evaluations show that this method was valid for assessing child food intake in comparison to 24-hour recall measurements and that parents perceived it as easy to use (131). Participants reported food intake for three predefined days, two weekdays and one weekend day. Reported days were weighted to represent children's weekly consumption. Collected data were assessed by the research team and amounts consumed were converted to decilitres (dl). Measures were sorted under three composite scores: unhealthy foods (UF) including salty snacks, candy, ice cream, baked desserts, and cookies; healthy foods (HF) including fruits and vegetables; and sweet beverages (SB) including sweetened milk, juices, and sodas.

4.6.1.4 *Children's adherence to recommended behaviours*

Participants were categorized into *adherent* and *non-adherent* in relation to recommended behaviours for children, based on measures at baseline. Cut-offs for recommended dietary behaviours were defined as: Intake of SB and UF ≤ 7 dl/week; HF ≥ 7 dl/week, based on Nordic nutritional recommendations (132). Regarding physical activity, an average of MVPA ≥ 60 min/day was set as cut-off for recommended behaviour, in accordance with the WHO guidelines for children (29). For the MVPA cut-off, weekdays included both school and leisure time Monday to Friday, and weekends included Saturday and Sunday.

4.6.2 **Analyses**

4.6.2.1 *Linear regression analysis*

Linear regression analysis was used to test the association between school nurses' MI skills and children's behaviours at T1, controlling for T0. The software used was SPSS version 27 (121). Significance and confidence levels were set to 95%. Mahalanobi's test for multivariate outliers was applied to all outcome variables. In addition to the linear regression, a multilevel model was applied with two levels: child and school nurse. This was to adjust for potential significant cluster effects of the other HSSP intervention components, i.e., classroom lectures, brochure dissemination, and the diabetes risk test for parents. Hence, a random intercept was included to detect between-cluster differences at school nurse level. Maximum likelihood

with -2 Log Likelihood was used to assess model fit for the nested models as compared to the models in the first analytical step. However, this multilevel model revealed no significant variation on the school nurse level and no significant improvement of model fit according to -2 Log Likelihood value. Last, subgroups, based on adherence or non-adherence to recommended behaviours at baseline, were analysed separately. Subgroup analyses were performed by applying the previously described first analytical step.

4.6.2.2 *Additional analyses*

Paired samples t-test with 2-tailed significance levels of 95% was used to compare mean differences between children's food and activity change as measured before and after the intervention. Sub-group analyses were based on child adherence to recommended behaviours at baseline (**Additional findings A**).

4.7 ETHICAL CONSIDERATIONS

Research including human subjects must follow universal ethical principles in accordance with the Helsinki Declaration (133). Ethical approval for the HSSP was obtained from the Research Ethics Committee in Stockholm, part of the Swedish Central Ethical Review Board (No. 2017/711–31/1).

4.7.1 Studies in relation to ethical principles

In the coming section, the HSSP trial in general and the specific studies included in this thesis in particular, will be scrutinized in relation to the seven ethical principles suggested by Emanuel et al. (134): *Social or clinical value*, *Scientific validity*, *Fair subject selection*, *Favourable risk-benefit ratio*, *Independent review*, *Informed consent*, and *Respect for potential and enrolled subjects*.

4.7.1.1 *Social or scientific value*

Regarding *social or scientific value*, the HSSP trial builds on a theoretical understanding of children's social and cognitive development (see section **Error! Reference source not found.**), and as such the intervention could be valuable for the future development of primary school education and parental support. Furthermore, school nurses' importance for children's development, the unequal reach of interventions, and the lack of evidence-based practices for school health care have been discussed on a national level (78, 135).

4.7.1.2 *Scientific validity*

When considering the principle of *Scientific validity*, the HSSP trial was planned and executed by a team of highly educated researchers active in a university research environment and with profound experience in the specific research field. Furthermore, the validity of methods used in specific studies was discussed in relation to the interpretation and concluding remarks of the findings.

4.7.1.3 *Fair subject selection*

According to the principal *Fair subject selection* participants from stigmatized and/or vulnerable groups in society should not be targeted for high-risk research. On the one hand, the HSSP trial involved two vulnerable groups in society: children and families from disadvantaged socioeconomic positions. On the other hand, the HSSP trial did not include any high-risk or intrusive interventions.

4.7.1.4 *Favourable risk-benefit ratio*

Research involving children is a delicate ethical issue where intervention risks need to be weighed against direct benefits. Traditionally, studies have been conducted *on* children, i.e., about children but from an adult perspective. To ensure that children's voices are heard, research should also be conducted together *with* children, i.e., describing children's perspective (136). All children in the HSSP trial were measured on three occasions by trained research assistants, i.e., research was done *on* the children. This might have caused stress for the children. However, the children were never forced or persuaded to participate, and the impression was that the children found participation in HSSP fun and exciting. Moreover, developing evidence-based practices for school nurses' health promoting activities can potentially improve the lives of many more children. Also, the research team conducted research *with* children's perceptions of participating in the HSSP, as described elsewhere (137).

4.7.1.5 *Independent review*

Regarding the principle of *Independent review*, all studies included in this thesis (I-IV) have been, or will be, submitted to a scientific journal for peer review. Moreover, all external funders will be declared as part of the review process, for transparency regarding potential conflicts of interest.

4.7.1.6 *Informed consent*

Regarding the principle of *Informed consent*, in the HSSP trial, written consent to participate was obtained from all parents, teachers, and school nurses. An additional oral consent was obtained from parents before recording of the MI conversations and interviews. Moreover, all children gave oral consent before any physical measurements were done.

4.7.1.7 *Respect for potential and enrolled subjects*

In accordance with the principle of *Respect for potential and enrolled subjects*, all collected data in the HSSP trial were stored on a secure and encrypted server managed by Karolinska Institutet. Participating schools, nurses, teachers, and families were informed about the possibility to withdraw from the trial at any time, without any reprimand. Moreover, results from the trial are continuously being summarized in simple language and communicated to participants.

5 RESULTS

5.1 PARTICIPANTS

A selection of characteristics of the participants in the four studies are presented in **Table 3**. In sum, school nurses in intervention schools ($n = 7$) conducted in total 99 MI conversations parents. The intervention school nurses had a mean age of 47 years, had worked on average for three years as a school nurse, and three of them had previous MI training. Regarding parents, mothers participated in the studies more often than fathers and on average 30% (range 23–50) were of non-Nordic origin. There was an equal distribution of boys and girls throughout the studies, and majority of the children had normal weight at baseline (116).

Table 3. Summary of characteristics of participants in the four studies and in additional analyses presented in this thesis.

Characteristics	Study						
	I ^a	II ^b	III ^c	III ^d	III/IV ^e	A ^f	B ^g
School nurses	-	-	7	7	7	-	16
Intervention/control (n)	-	-	7/0	7/0	7/0	-	7/9
Parents (n)	32	241	65	17	99	99	-
Mothers/Fathers (n)	18/14	144/97	47/18	10/7	65/34	65/34	-
Education: Low ¹ (%)	50	26	26	23	27	27	-
Origin: Non-Nordic ² (%)	62	32	65	65	65	65	-
Children (n)	30	160	65	17	97	97	-
Girls/Boys (n)	15/15	85/75	31/34	9/8	48/49	48/49	-
Normal weight ³ (%)	100	76	72	71	74	74	-

1. Low level education: ≤ 12 years formal education

2. Nordic countries: Including Sweden, Norway, Denmark, Finland, and Iceland

3. Normal weight: according to Cloe and Lobstein (115).

a. Sample of real-life, audio-recorded MI conversations delivered by school nurses with parents in intervention schools

b. Comprehensive Parental Feeding Practices Questionnaire

c. Parents and school nurses' ratings of participating and performing MI

d. Semi-structured interviews with parents and school nurses in intervention schools

e. Real-life, audio-recorded MI conversations delivered by school nurses with parents in intervention schools

f. Food intake and physical activity of children in intervention schools, measured before and after the intervention

g. Standardized MI conversations delivered by school nurses with actor posing as parent, before and after MI training

5.2 WHAT TO INCLUDE IN HEALTH PROMOTING CONVERSATIONS WITH PARENTS?

5.2.1 Parents' expressed thoughts and inquiries

Qualitative content analyses applied on real-life health conversations between parents of normal weight children and school nurses (**Study I**) revealed five generic categories reflecting parents' thoughts regarding children's food and physical activity behaviours: (1) Children's personality in relation to food and physical activity; (2) Recognising children's food and physical activity behaviours; (3) Parenting in relation to food and physical activity; (4) Interaction with children in situations around food and physical activity; (5) Contextual circumstances to promote children's healthy food and physical activity behaviours (**Figure 5**). In sum, these study findings unveil how parents focus the conversation in five specific areas when discussing their normal weight children's food and physical activity behaviours.

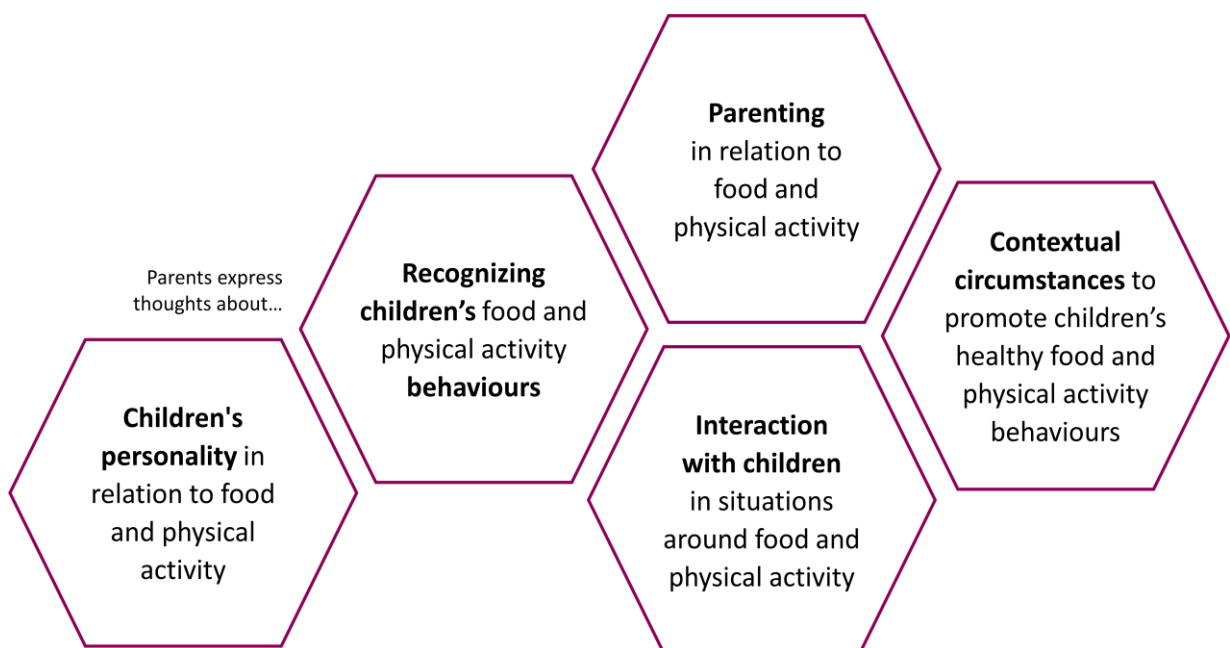


Figure 5. Overview of generic categories.

5.2.3 Parental feeding practices in relation to children’s weight status

When comparing the variance of mean scores of CPFQ answers between parents of children with different weight status (**Study II**), we found that parents of normal weight children had higher group means on *Pressure to eat* than parents of children with overweight or obesity, whereas parents of children with overweight or obesity had higher means on *Restriction for health* and *Restriction for weight control* than parents of children with normal weight (**Table 4**).

Sub-group analyses showed that parents’ educational level and region of birth had underlying influence on PFPs with regard to children’s weight status. Parents of children with normal weight and with higher-level education scored higher on providing a healthy *Environment* than parents with the same level of education whose children had overweight or obesity ($F = 4.226, p < 0.001$). Moreover, parents with a non-Nordic background scored significantly higher on *Pressure to eat* when they had normal-weight children, than parents of non-Nordic origin with children with overweight or obesity ($F = 14.911, p < 0.001$).

Table 4. Means (and standard deviations) for parenting feeding practices by child weight status. Differences between group means have been analysed with one-way ANOVA with F-ratio.

CPFQ construct	Total sample		Child weight status ¹				df	F
	N	Mean (SD)	Normal weight		Overweight/obesity			
			n	Mean (SD)	n	Mean (SD)		
Positive practices								
Monitoring	241	4.0 (1.0)	182	4.1 (0.9)	59	4.0 (1.0)	1	0.42
Environment	241	3.5 (0.7)	182	3.6 (0.7)	59	3.5 (0.7)	1	0.23
Modelling	241	3.7 (1.0)	182	3.7 (0.9)	59	3.7 (0.9)	1	0.03
Encourage balance and variety	241	4.1 (0.6)	182	4.1 (0.6)	59	4.1 (0.7)	1	0.09
Involvement	241	3.1 (0.9)	182	3.1 (0.9)	59	2.9 (0.8)	1	2.44
Negative practices								
Emotion regulation	241	1.7 (0.7)	182	1.7 (0.7)	59	1.6 (0.6)	1	2.51
Food as a reward	241	2.0 (0.8)	182	2.0 (0.8)	59	1.9 (0.7)	1	0.29
Pressure to eat	241	2.6 (1.0)	182	2.7 (1.0)	59	2.2 (0.9)	1	12.76*
Restriction for health	241	2.7 (0.8)	182	2.6 (0.8)	59	3.1 (0.7)	1	16.69*
Restriction for weight control	241	1.5 (0.8)	182	1.3 (0.6)	59	2.2 (1.0)	1	69.27*

* Significance level <0.001

1. Child weight status: based on objective measures of height and weight adjusted for child sex and age, subdivided according to international standard cut-offs for normal weight, overweight and obesity (116).

5.2.5 Changed unhealthy behaviour or sustained positive behaviour?

Additional unpublished findings (A) regarding children in intervention schools are presented in **Table 5**. Findings suggest that children in families that were *non-adherent* to recommended behaviours at baseline improved both food intake and activity behaviours after intervention as compared to baseline. Analyses on the total group of intervention children showed no change regarding food intake after intervention.

Contrasting findings between sub-groups were found when considering intake of unhealthy foods. Analyses showed that *non-adherent* children's intake decreased significantly after the intervention. However, findings also suggested that *adherent* children significantly increased their intake after the intervention. Regarding physical activity, findings indicated improved physical activity during weekends in the total group of children. In the sub-group of children *non-adherent* to recommended levels of weekly MVPA at baseline, post-intervention measures were significantly higher, indicating adherence to recommended amounts of physical activity compared to baseline. Children adhering to recommended behaviours at baseline, showed sustained physical activity after intervention (**Table 5**).

Table 5. Paired-sample t-test for children's behaviours before and after intervention. Presented as means for the whole sample and means by sub-group based on adherence to recommended behaviours at baseline.

	t	DF	pre M (SD)	post M (SD)	p
Food intake (DL)					
Unhealthy foods ¹	1.89	53	11.1 (8.8)	8.9 (6.6)	
Non-adherent	3.69	33	16.0 (7.4)	10.6 (6.5)	**
Adherent	-2.56	19	2.8 (2.2)	5.9 (5.7)	*
Healthy foods ²	0.65	53	15.0 (9.6)	14.1 (9.3)	
Non-adherent	-2.1	14	3.9 (2.5)	7.4 (6.3)	*
Adherent	1.54	38	19.2 (7.6)	16.6 (9.0)	
Physical activity (MVPA) ³					
Monday–Friday (non-school hours)	-4.40	75	22.2 (11.9)	29.1 (13.9)	**
Non-adherent	-3.61	18	14.1 (6.6)	24.3 (11.6)	*
Adherent	-3.14	57	24.8 (12.0)	30.7 (14.3)	*
Saturday–Sunday	-2.40	48	61.0 (23.5)	70.7 (29.1)	*
Non-adherent	-2.25	9	36.7 (8.7)	58.3 (30.8)	*
Adherent	-1.51	37	67.4 (22.5)	74.3 (28.0)	
Weekly average	-3.33	76	77.8 (24.0)	87.1 (25.3)	**
Non-adherent	-4.52	19	49.1 (10.2)	73.4 (21.7)	**
Adherent	-1.46	58	87.1 (19.4)	91.6 (25.0)	

* Significant at 0.05 level (2-tailed)

** Significant at 0.001 level (2-tailed)

1. Unhealthy foods = salty snacks, candy, ice cream, baked desserts, cookies, and sweet beverages i.e. sweetened milk, juices, and sodas. Adherence, cut-off: weekly intake ≤ 7 dl/week (132).

2. Healthy foods = Fruits and vegetables. Adherence, cut-off: weekly intake ≥ 7 dl/week (132).

3. MVPA = Moderate to vigorous physical activity (130). Adherence, cut-off: Weekly average ≥ 60 min/day (29). Weekly average includes both school and leisure time.

5.3 MOTIVATIONAL INTERVIEWING AS A METHOD FOR HEALTH PROMOTING CONVERSATIONS

5.3.1 School nurses' MI competence after MI training

Additional unpublished findings (B) revealed that school nurses did not reach any of the suggested thresholds for basic MI proficiency (93). Nonetheless, after participating in MI training, intervention school nurses improved the global MI skill of showing empathy, and some of the micro skills, i.e., increasing MI adherent behaviours, whereas nurses from control schools remained at the same or lower levels on all competence measures (**Table 6**).

Table 6. Paired-sample t-test for school nurses' MI competence pre and post MI training (for intervention school nurses). Presented as grand mean for all school nurses (n=16) and separate for intervention school nurses (n=7) and nurses from control from control schools (n=9).

School nurses' MI behaviours ¹	t	DF	Pre M (SD)	Post M (SD)	p
Cultivating change talk	-1.0	15	1.2 (0.4)	1.3 (0.5)	
Intervention	-2.1	6	1.1 (0.4)	1.6 (0.5)	
Control	1.0	8	1.2 (0.3)	1.1 (0.3)	
Softening sustain talk	-0.4	15	1.3 (0.4)	1.3 (0.5)	
Intervention	-1.0	6	1.1 (0.4)	1.4 (0.6)	
Control	0.6	8	1.3 (0.5)	1.2 (0.7)	
Partnership	0.3	15	1.5 (0.7)	1.4 (0.6)	
Intervention	-2.1	6	1.3 (0.5)	1.7 (0.5)	
Control	1.8	8	1.7 (0.9)	1.2 (0.7)	
Empathy	-0.4	15	1.5 (0.6)	1.6 (0.6)	
Intervention	-2.8	6	1.3 (0.5)	1.9 (0.4)	*
Control	2.0	8	1.7 (0.7)	1.3 (0.7)	
MIA	-0.6	15	2.8 (2.2)	3.3 (2.8)	
Intervention	-3.2	6	2.0 (1.7)	5.1 (3.2)	*
Control	1.7	8	3.4 (2.4)	1.9 (1.3)	
MINA	-0.2	15	4.4 (2.7)	4.6 (3.6)	
Intervention	2.2	6	4.3 (1.7)	1.7 (2.1)	
Control	-2.3	8	4.6 (3.4)	6.9 (2.9)	*
R:Q	-1.4	15	0.5 (0.3)	0.7 (0.4)	
Intervention	-2.0	6	0.4 (0.3)	0.8 (0.4)	
Control	-0.1	8	0.6 (0.2)	0.6 (0.4)	

* Significant at 0.05 level (2-tailed)

1. Standardized MI conversations with actor, conducted before and after MI training (for intervention school nurses), and coded with the MITI 4 protocol (93).

5.3.2 Associations between objective ratings of MI competence and children's behaviour change

Linear regression analyses suggest that objectively assessed MI competence was not associated with child behaviour change in the whole group (**Study III**). However, when considering child adherence to recommended behaviours at baseline, some of the global scores were significantly associated with improved food and physical activity behaviours. Three of the global scores (cultivating change talk, softening sustain talk, and partnership) were significantly related to a decrease in the consumption of unhealthy foods and beverages in the group of children with an unhealthy diet at baseline. The global technical score on softening sustain talk and the global relational score on partnership were associated with children's decreased intake of unhealthy foods and sweet beverages. Regarding counts of micro skills, a significant association was found for percent complex reflections and children's decreased intake of unhealthy foods and increased MVPA during weekends. Also, a higher reflection-to-question ratio was associated with a decreased weekly intake of unhealthy foods and beverages.

5.3.3 Ratings and perceptions of school nurses' MI competence

Objective and subjective ratings of MI competence (**Study IV**) indicated that parents generally rated nurses' ability to cultivate change and empathy higher than both nurses themselves and objective MITI coders. No significant correlations between the ratings reflecting nurses' ability to cultivate change were found. Nonetheless, parents' ratings of nurses' *empathy* significantly correlated with how nurses themselves rated their *empathy* competence. Furthermore, nurses' ratings were found to significantly correlate with objective MITI ratings regarding the *reflections-to-questions ratio*. Qualitative analyses regarding parents' and school nurses' perceptions of participating in MI sessions generated two joint generic categories: "*meeting the other*" and "*perceived quality*". In the school nurses' domain, *meeting the other* consisted of two subcategories: "*shifting power relations in sensitive meetings*" and "*just taking the time to listen and confirm*". Corresponding subcategories derived from parent interviews were "*respectful and professional*" and "*person-centred or not*". The main category "*perceived quality*" was constructed by combining school nurse subcategories "*mastering MI as a method*" and "*challenges and lessons learnt*", along with the subcategory "*motivated and empowered*" from the parents' domain.

When quantitative and qualitative results were combined in a joint display, three overarching joint concepts emerged: "*recognise and cultivate parents' motivation*", "*ability to listen and reflect what parents say*", and "*show consideration for parents' worldview*" (**Table 7**). In sum, findings suggested that school nurses' MI performances were rated and perceived as valuable and family-centred by both school nurses and parents, who had left the meeting feeling motivated and empowered to promote their children's healthy behaviours. Nonetheless, school nurses were critical of their own technical MI performance, and they found that reflections were easier to deliver and to self-rate.

Table 4. Joint display of quantitative and qualitative findings, presented as joint concepts with respective correlations, and linked generic categories and sub-categories with illustrative quotes. * Indicates $p < 0.05$ (2-tailed) ** indicates $p < 0.01$ (2-tailed)

Joint concepts	Correlations			School Nurses' perceptions		Parents' perceptions	
	MITI vs. SN (r)	MITI vs. Parent (r)	SN vs. Parent (r)	Generic category			
Recognize and cultivate parents' motivation Quantitative variables: - Cultivate change talk Qualitative category: - Perceived quality	0.17	0.13	-0.10	Perceived quality Mastering MI as a method <i>"I had a hard time finding this change talk, and I ended up in a more supportive role" (School nurse 5)</i> Challenges and lessons learnt <i>"MI was very difficult [with interpreter], I couldn't do it" (School nurse 1)</i> Mastering MI as a method <i>"Simple reflections is one thing, but when you need to use, what do you call them, advanced reflections, those are somehow more difficult" (School nurse 6)</i>			
	0.40**	n/a	n/a				
Ability to listen and reflect what parents say Quantitative variables: - Reflections Qualitative category: - Perceived quality	Sub-categories and quotes			Meeting the other Respectful and professional <i>"Yes, she [the school nurse] was amazing, she gives information calmly and it was not stressful and on a good level" (Father 1)</i> Person-centred – or not <i>"It wasn't like she [the school nurse] was in charge, but I kind of got to talk about what I was experiencing" (Mother 2)</i>			
	Sub-categories and quotes			Shifting power relations in a sensitive meeting <i>"There was no lecturing from me, no finger-wagging from the school nurse so to speak" (School nurse 1)</i> Just taking the time to listen and confirm <i>"So, that's a little bit what I mean, to be listened to... they [the parents] actually got the chance and the time" (School nurse 2)</i>			
Joint concept Show consideration for parents' worldview Quantitative variables: - Empathy Qualitative category: - Meeting the other	Correlations			Generic category			
	MITI vs. SN (r)	MITI vs. Parent (r)	SN vs. Parent (r)	Meeting the other Respectful and professional <i>"Yes, she [the school nurse] was amazing, she gives information calmly and it was not stressful and on a good level" (Father 1)</i> Person-centred – or not <i>"It wasn't like she [the school nurse] was in charge, but I kind of got to talk about what I was experiencing" (Mother 2)</i>			
Sub-categories and quotes			Shifting power relations in a sensitive meeting <i>"There was no lecturing from me, no finger-wagging from the school nurse so to speak" (School nurse 1)</i> Just taking the time to listen and confirm <i>"So, that's a little bit what I mean, to be listened to... they [the parents] actually got the chance and the time" (School nurse 2)</i>				

6 DISCUSSION

6.1 MAIN FINDINGS

The two overarching aims of this doctoral thesis were to 1) understand how MI could be used in health promoting conversations with parents in the school context, and 2) explore school nurses' and parents' experiences of delivering and participating in MI sessions.

6.1.1 Health promoting conversations in the school context

Findings in **Study I** suggested that during health conversations with the school nurse, parents of normal weight children expressed thoughts and inquiries regarding children's personality, healthy behaviours for children, parenting practices, and contextual circumstances for providing healthy behaviours for their children. Furthermore, when comparing parents' answers regarding feeding practices in **Study II**, findings were that parents of normal weight children scored higher on pressuring their child to eat, when compared to parents of children with overweight or obesity. Moreover, **Additional findings A** as well as findings from subgroup analyses in **Study III** suggested that children's adherence to recommended behaviours could be of importance for the effectiveness of health promoting conversations. In addition, findings from **Study II** indicate that knowledge regarding parents' educational status and region of birth might be important when planning interventions for promotion of *positive* parenting feeding practices.

6.1.2 School nurses' Motivational Interviewing performance

School nurses in the HSSP trial did not reach previously suggested thresholds for MI competence. Nonetheless, **Additional findings B** suggest that the intervention school nurses significantly improved some of their MI skills after MI training. Furthermore, when objective quality ratings of school nurses' MI performance were compared to changes in child behaviours after the conversations (**Study III**), findings indicated that some MITI ratings were associated with changes in children's behaviours. Comparison of MITI ratings with parents' and school nurses' subjective ratings (**Study IV**), revealed that objective MITI ratings were consistently lower than both parents' and school nurses' scores, and that parents' ratings were highest, indicating that parents were satisfied with the conversations. Furthermore, during semi-structured interviews (**Study IV**), parents described the school nurses as professional and empathetic, and the MI sessions as inspiring and valuable for stimulating thoughts around children's behaviours and parenting practices.

6.2 BEHAVIOUR CHANGE DOMINOES SET IN MOTION

For effective interventions, researchers and practitioners need to build their practices on a foundation of relevant theories (138). The theoretical foundation for the HSSP (106) was the *Social cognitive theory* (139) with parental self-efficacy and child observational learning as central constructs. However, given that the *Social cognitive theory* does not explain all levels of behaviour change, additional theories could be useful (140). To be successful, the HSSP

(106) had to initiate a series of behavioural change events, from external intervention inputs, through school nurses' and parents' motivation for behaviour change, that ultimately affect children's health-related behaviours (**Figure 6**).

First, school nurses needed to learn how to use MI as a method, and then use their acquired skills in health conversations with parents. This process could be further understood by using an implementation theory such as the *Behaviour change wheel* (141, 142). Second, parents needed to be motivated to change or sustain healthy parenting practices in relation to their children's food and physical activity. This process could be framed by using classic theories on the psychology of behaviour change such as the *Health belief model* (143). Last, children needed to be exposed to various health actions, and were expected to react accordingly, as theorized by the classic *Social cognitive theory* (139, 141).

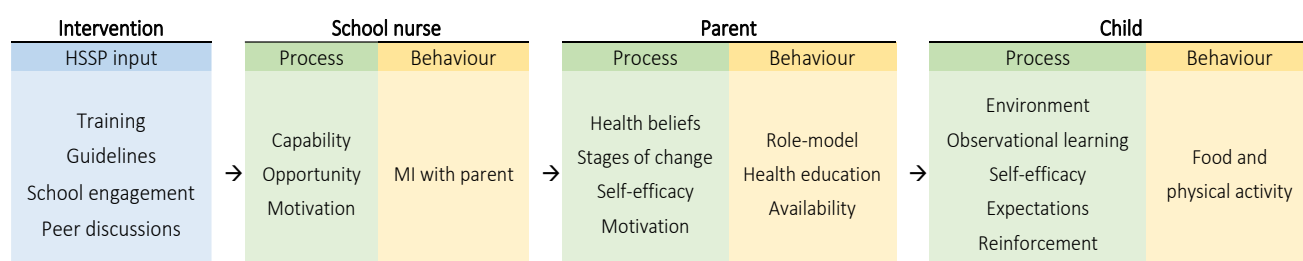


Figure 6. Behaviour change dominoes in a theoretical chain of events that starts from enabling school nurses' use of Motivational Interviewing with parents to promote children's healthy food and physical activity behaviours.

6.2.1 Facilitating school nurses' use of Motivational Interviewing

The first domino in the behaviour change movement are the school nurses (**Figure 6**) who were trained to perform health conversations with parents based on the conversational method Motivational Interviewing. Michie et al. (142) describe the core trinity of the organizational change process in the *behaviour change wheel* as individuals' *capability*, *opportunity*, and *motivation* to commit to and adapt changes. The construct *capability* consists of a person's (e.g., school nurse's) physical and psychological capacity, which can be affected by, e.g., guidelines, training, and changes in the environment. *Opportunity* consists of both social and physical opportunities to adopt a behaviour change. These could include influences regarding, e.g., adoption and dissemination of policy, clear responsibility, sufficient support, and adequate workload. The construct *motivation* can be divided into reflective and automatic motivators, where the reflective motivators are derived from rational reasoning and the automatic motivators are of a more emotional nature. In turn, a person's motivation to adopt an intervention can be altered, for example by enabling and skills development (142). By providing school nurses in the HSSP trial with an extensive MI training, consisting of both theoretical and practical features, the intention was to enable school nurses to use MI by strengthening their capability. Moreover, the group activities and peer discussions that formed part of the MI training, were aimed to enhance school nurses'

motivation; organisational opportunity was addressed by involving school principals in the implementation process.

6.2.2 Motivating parents to be agents for children's healthy behaviours

The next domino in the behaviour change chain of events is influencing parents to act as agents for children's healthy behaviours through the health conversations with the school nurse (**Figure 6**). The *Health belief model* (143) proposes a theory that helps us understand what influences parents' motivation to change or sustain their children's behaviours.

First, the *Health belief model* describes how beliefs regarding the overall threat of a potential condition might impact health behaviours. Perceived threats are defined as beliefs regarding one's own susceptibility to a condition and beliefs about the severity of that condition. Second, a person's beliefs about the benefits, availability, and effectiveness of a specific threat-reducing behaviour influences the probability of adopting that behaviour. In sum, if a person's perceived health benefits outweigh the perceived barriers for acting, a person is likely to take preventive action. In addition, perceived self-efficacy, defined as people's confidence in their capability to deal with a specific situation, increases the probability of a behaviour being adopted. Moreover, health beliefs are modified by personal and structural factors, and could also be affected by different cues to action, e.g., health campaigns, reminders from health authorities, or illness of family member or friend (143). This model is useful for understanding what might influence parent's health beliefs and health promoting cues for actions.

Regarding the HSSP parents, the health promoting conversation could be a cue to action with the potential to increase parents' awareness of the importance of acting as role model in situations concerning food and physical activity, as well as making healthy foods and physical activity available in the home environment. Combining the *Health belief model* (143) with the proposed mechanisms of MI (90) suggests a pathway for how HSSP might work: school nurses with high relational skills, using MI accurately, would enhance parents' perceived self-efficacy, increasing parents' talk about their child's behaviours in relation to potential benefit (i.e., *perceived benefits*), and supporting *positive* parenting practices, which in turn could lead to changed or sustained child *behaviour* (90, 144).

6.2.3 Children's behaviours – a product of the social environment

The last domino set in motion from previous actions involves influencing children's health behaviours in the home environment (**Figure 6**). One of the most used theories in school-based interventions aimed at younger children (145) is the *Social cognitive theory* (139), developed by psychologist Albert Bandura in the 1980s in an effort to explain human thought, motivation, and behaviour. Central to the *Social cognitive theory* are three domains: *environment*, *behaviour*, and *personal factors*, interacting reciprocally. Within these three domains, central constructs for behaviour change are argued to involve: *self-efficacy* – belief in one's own ability to perform a specific activity, *observational learning* – seeing from others how a behaviour is done, *expectations* – anticipated consequences of a behaviour, and

reinforcement – responses to a performed behaviour (39, 146). Children in the HSSP trial were also exposed to teachers' health promoting activities through the classroom lectures with home assignments (106). The overall purpose of the home assignments was not just to reinforce children's healthy behaviours and self-efficacy, but also to reach parents with health information. Another purpose was to give the parents an opportunity to act as positive role models and to promote observational learning for the child.

6.3 DISCUSSION OF APPLIED METHODS

The philosophical question of what to consider true knowledge (*episteme*), has been discussed vividly throughout history. Traditionally, research fields are divided into two contrasting paradigms: the generalizable and measurable *quantitative* paradigm versus the context-specific and holistic *qualitative* paradigm. As researchers, we have to consider our own worldview and choose methodological approaches accordingly (115, 147).

6.3.1 Validity and reliability of quantitative methods

The philosophical approach to knowledge based on *postpositivism* (147) was considered in this thesis in studies II, III, IV, and additional findings A and B. This worldview applies a strict objective approach, where *valid* and *reliable* methods are essential for explaining the studied reality (147). On this note, the concept of *validity* in quantitative methodology is often divided into *external validity* and *internal validity*. *External validity* defines how well conclusions from the studied sample can be translated to the whole population, whereas *internal validity* only refers to the studied sample and incorporates the quality of the study design and data collection. *Reliability* in quantitative research refers to the accuracy and repeatability of measures used: calibrated and standardized procedures are preferred as they give better reliability (147). By reporting and discussing details related to *external validity* (e.g. participant characteristics and study context) and *internal validity* (e.g. sampling procedure and tools used) as well as *reliability* measures (e.g. Cronbach's alpha and internal consistency coefficient) the researcher assures the reader that the findings are trustworthy and thus describe the studied reality (147).

Several different quantitative measures were used for the studies presented in this thesis. Three of the studies (studies III, IV and B) describe school nurses' MI competence based on coded MI sessions. The MITI protocol (93) is considered a valid and reliable method for coding MI competence in clinical practice (92). Also, MITI coders working with data generation had acceptable inter-rater reliability (**Table 2**). Nonetheless, the MITI system was developed and evaluated on MI when used in clinical practice targeting adult populations with the aim of changing existing unhealthy behaviours (90). Hence, the clinical thresholds for effective MI in health promoting practices targeting child behaviours remains unknown. Moreover, **Study II** used questions for participants' ratings of MI that had not been validated and those findings should be interpreted with caution. In future similar studies, an improved and validated version of the *Client Perspective of Motivational Interviewing* tool (148, 149) should be used.

Two of the studies presented in this thesis (**III and A**) were based on measures representing children's food and physical activity behaviours. The accelerometric method we used for measuring children's MVPA is considered valid and reliable (129). Regarding children's food consumption, our data derived from a newly developed and validated photo-based method (131) that has been described as valid when compared to previously established methods, and was acceptable to participants (131). Nonetheless, measuring children's food consumption in a reliable way is tricky: study participants often make incorrect estimates of their consumption. With this in mind, results regarding children's food intake should be interpreted with caution and inferences should only be made on group level (150). Moreover, food and physical activity measurements were used to estimate adherence to recommended baseline behaviours (**Studies III and A**). The cut-offs used in these studies had not previously been validated for a similar purpose. The cut-offs for physical activity were based on recently developed global recommendations (29) and should be considered reliable. However, since no similar universal recommendations regarding children's food intake were found, the cut-offs were calculated based on Swedish nutritional recommendations for children (33) and the results might thus not be generalizable to other populations. Regarding the use of the Swedish CPFQ (**Study IV**) the translation had yet to be validated when analyses were made, and this may have biased measures. This was approached by presenting preliminary validity measures in the manuscript and discussing this as a limitation. Nonetheless, the validation of the Swedish CPFQ is ongoing with expected publication later this year, and so far, the validity and reliability measures appear acceptable.

As an intervention researcher one must appraise what intervention outcomes to expect and if the methods applied actually measure the outcomes of interest. Regarding the outcomes of the HSSP trial, several favourable behaviour changes were observed among the intervention children when compared with children from control schools, i.e., lower intake of unhealthy foods, higher intake of fruits and vegetables, and higher level of physical activity (113). Nonetheless, the intervention included entire schools and the majority of the children in the HSSP sample had healthy behaviours and weight status at baseline (147). Moreover, findings from **unpublished results** presented in this thesis (**Table 6**) indicated that children non-adherent to recommended behaviours improved their behaviours, whereas adherent children both sustained most of their healthy behaviours. Hence, one could argue that sustained healthy behaviours, presented as a non-significant change of behaviours in children adhering to recommended behaviours at baseline, could be considered a desired and positive effect of a universal health promoting intervention. However, most health interventions targeting children use reduction of unhealthy behaviours as measure of intervention effects, whereas descriptions of methodological approaches for measuring sustained healthy behaviours are lacking. On this note, risk-ratio and multiple point prevalence of abstinence are commonly used measures to assess intervention effects within relapse prevention research (151, 152). This notion could be an inspiration for future studies to further develop methodological approaches for measuring sustainment of established healthy behaviours in children as a measure of universal intervention effects.

Moreover, considering the theorized pathways of change in the HSSP intervention (**Figure 4**), several mediators besides the presented PFP should be of importance for sustainable outcomes. Hence, findings presented in this thesis could have been strengthened by including additional quantitative measures of potential mediators such as school nurses' motivation and self-efficacy (153), as well as parents' health literacy and health beliefs (154). These measures would have provided a more holistic understanding of school nurses' and parents' perspectives. However, ethical issues such as participant burden of completing more surveys and (potential) overload of data for the research group to process, had to be considered, and therefore a selection of feasible measures had to be made.

6.3.2 Trustworthiness of qualitative research

The philosophical approach of *social constructionism* (115, 147) was considered when conducting the qualitative studies (I and IV) included in this thesis. This worldview considers experiences, interpretations, and feelings of individuals that arise in social interactions as being part of constructing the “reality” and for that specific context (115, 147).

Qualitative research methodology requires several measures for assuring *trustworthiness* of findings; these measures need to be incorporated into the research process (115). Lincoln and Guba (126) stress that in order to claim *trustworthiness* in qualitative research, four main areas should be considered: 1) *credibility* refers to confidence in the accuracy in findings, 2) *dependability* addresses replicability of applied methods, 3) *confirmability* accounts for bias in reported findings, and 4) *transferability* refers to the applicability of findings to other contexts (126).

When conducting the qualitative studies (I and IV) several techniques to ensure *trustworthiness* were applied. Regarding *credibility*, all authors read and participated in coding transcripts (*triangulation*), categories and phrasings were continuously discussed (*peer debriefing*), and categories were illustrated with quotes from the raw data. When it comes to *dependability*, transcripts were compared with audio-recordings, and coded transcripts were compared between authors (*cross-checked*). *Confirmability* was addressed through analyses being organized in a structured and transparent manner (*audit trail*), and with authors who had diverse and relevant clinical background for the studied context that was declared in the research report (*reflexivity*). Last, a rigorous account of the study participants and context (*thick description*) was provided in the study reports to give a good foundation for the reader to judge *transferability* of the results.

6.3.3 Integrating multiple methods

The philosophical worldview of *pragmatism* (147) was applied when conducting the mixed-methods study (IV) presented in this thesis. This approach starts from the identified research inquiry, as opposed to research questions springing out of preferred methods, and allows for a combination of ontologies (both postpositivism and constructionism) as well as multiple methodologies (147). Thus, applied strategies considering reliability, validity and credibility for study IV were described in previous sections (1.4.1 and 1.4.2).

6.4 INTERPRETATION OF FINDINGS

6.4.1 It takes a village to raise a healthy child – universal health promotion

To think that one single intervention will impact families' behaviours over time is naïve. Findings from **Study I** revealed that parents are influenced by many outer structures when promoting healthy behaviours for their children in the home environment. Nonetheless, school nurses can help parents navigate the *how* and the *what* of health promoting parenting. For example, parents considered the built environment, accessibility to public spaces, and seasonal weather important factors influencing the promotion of physical activity, whereas domestic interaction, availability of produce, and social and medial influences were considered important for promoting healthy food behaviours. In line with these findings, previous research has argued that parents are subject to multifactorial influences for promoting children's healthy behaviours (110) and thus health promoting environments should be crucial for healthy populations. This thesis uses data from the HSSP intervention (106) that targets only the individual and family level of the socio-ecological model (**Figure 1**), and does not consider other important influential structures such as the built environment, commerce, and public health policies (63). In conclusion, parents' thoughts described in the findings of **Study I** can guide school nurses in how to adapt their conversational skills: children's personalities and preferences; beliefs of what constitutes healthy behaviours for children and possible consequences; thoughts around parents' responsibility and strategies; how parents interact with their children around food and physical activity; and contextual circumstances.

Findings from **Study II** suggest an association between child weight status and parent's feeding practices. Findings were that parents of children with overweight or obesity more often use restrictive practices. These findings were expected and similar to those of a systematic review on the topic (54). Causality was not investigated in our present study and thus conclusions around direction of influences cannot be drawn. Nonetheless, previous research on PFP and BMI of pre-school aged children conclude that, although the PFP–BMI relation is somewhat bidirectional, parents are more likely to adjust their feeding practices to child weight status, than the other way around (155).

Moreover, sub-group analyses in **Study II** suggest links between different ways of providing a healthy food *Environment* and differences in children's weight status. Highly educated parents of normal weight children scored higher on providing a healthy food *Environment* than parents of children with overweight or obesity. However, no other association between *positive* parenting practices, such as role-modelling and healthy guidance, and child weight status was detected. This could be due to the limited sample size or that the assessment tool needs adjustment. Nonetheless, authoritative feeding styles with associated practices such as autonomy support and structure, are argued to be of importance for healthy child development (54). Previous research has associated autonomy supportive parenting practices with school aged children's social and academic achievement (156). Nonetheless, a study done on pre-adolescents argues that parental autonomy support was associated with less

healthy food intake at school. On the other hand, health knowledge and availability of healthy foods in the home environment was associated with a positive ratio of healthy food intake outside the home (157). More research with validated tools and with larger samples of children in different age groups is needed to provide solid knowledge regarding *positive* PFP. Studies should focus on investigating the potential bidirectional association of PFPs potential effect on health-related behaviours and weight development in children, together with how child characteristics might influence *positive* and *negative* PFPs.

Furthermore, findings from **Study III** and **additional unpublished findings (A)** shed light on how children's already established behaviours might be of importance for the intended outcome, and that tailoring health promoting interventions could be of importance for the MI intervention effect. Therefore, future interventions targeting parenting practices should be designed to apply a more holistic approach including a focus on the environment outside of the home and with input from stakeholders (158). Judging from previous research, such health promoting interventions could include adjustments to the built environment, e.g., safe bike routes (159) and outdoor spaces (160), and increased adult responsibility and awareness through promotion of healthy options in retail marketing and social media (23). However, this will make the intervention even more complex and more challenging to implement.

6.4.2 Motivational Interviewing for health promoting conversations

Comparison of our additional unpublished results on school nurses' objectively rated MI competence with suggested thresholds for MI (93) suggested that intervention nurses did not reach basic MI proficiency after training (**Additional findings B**). Previous studies have found that MI is a difficult technique for health care staff to learn and uphold over time (161). A recent study the process clinicians learning MI as an internal paradigm shift, from understanding and valuing the spirit of MI to acquiring the appropriate technical MI skills for becoming person-centred health guides (162). Nonetheless, suggested thresholds for effective MI competence levels were developed by experienced practitioners and aimed at adult behaviour change; they have not been scientifically validated, but are experience-based (93).

Findings from **Study III** suggest that also lower levels of MI competence might be effective in health promoting conversations, and that children's established behaviours might be of importance for the observed effect. Previous evaluations of the HSS, where MI was delivered by expert MI practitioners, also found positive results regarding children's food consumption when compared to control schools (108). Similarly, in another intervention where nurses did not reach suggested thresholds for MI after training, children's consumption of fruits and vegetables improved significantly (163).

Nonetheless, previous studies have concluded that MI can be tricky to use in health promoting conversations with parents of school children in interventions with a universal approach where traditional problem behaviours are less frequent (e.g., destructive behaviours, overconsumption of unhealthy foods, or school absenteeism). In such health promoting conversation time is often spent identifying what topic to focus the session on and less time is

spent on eliciting motivating aspects for changed behaviours (164). Future MI training aimed at health promotion should focus on understanding what MI qualities are important in health promoting interventions targeting parents in particular, and incorporate these notions and provide appropriate skills for handling such encounters, where sustainment of healthy behaviours could be the target behaviour.

Results from **Study IV** revealed that objective MI ratings did not correlate with subjective ratings from parents and school nurses, and that parents rated nurses' health promoting skills (i.e., *empathy* and *cultivate change talk*) higher than both objective coders and the nurses themselves. Previous studies describe how MI practitioners' self-rated competence fails to correspond with objective MI competence measures (165, 166) and that additional supervision does not improve self-rating skills (167). Parents' ratings and experiences regarding the theorized core elements of MI (i.e., *empathy* and *cultivate change talk*) might be of importance for understanding what which elements of MI to emphasize in health promoting conversations. These findings can be related to the theorized mechanisms of MI that suggest higher scores for MI practitioners on technical and relational MI skills are associated with clients engaging in change talk (90). Nonetheless, studies including participants' perceptions of MI are scarce. The *Client Perspective of Motivational Interviewing* tool (148, 149) was developed for measuring the important perspective of MI recipients. Clients' ratings of MI sessions could be used, in addition to objective ratings, for understanding how to develop MI practice and adjust training. However, no studies associating MI participants' perceptions of MI with behaviour change outcomes have been found.

In sum, it seems that suggested thresholds for effective MI competence in health promoting practices need to be further studied, and that participants' experience of MI should be considered as important for evaluating future MI interventions.

7 CONCLUSIONS

Conclusions based on findings from this thesis include:

- Health promoting conversations delivered by school nurses trained in the conversational technique Motivational Interviewing were overall appreciated and perceived as respectful by both parents and school nurses
- School nurses found that MI brought a more equal power balance to the health conversation
- Some feeding practices differed between parents of children with overweight or obesity, as compared with parents of children with normal weight
- Parents of children with normal weight expressed thoughts and sought support from the school nurse regarding children's personalities and healthy behaviours, parenting practices, family interactions, and contextual influences on child behaviours
- Although school nurses did not reach previously suggested thresholds for MI competence, some beneficial changes in children's behaviours were seen after the intervention

Based on the findings included in this doctoral thesis, future research is needed regarding:

- Effective MI training for universal health promotion
- Clear guidance for school nurses' health promoting conversations
- Structured work procedures for health promoting activities in schools
- Sustained healthy behaviours as an outcome in health promoting interventions
- Validated and feasible tools for measuring children's dietary intake
- Evidence-based recommendations for children's unhealthy food consumption
- Effects of combined interventions on multiple levels of the socio-ecological model
- Perspectives of practitioners and participants on MI
- School nurses' self-efficacy in relation to health promoting activities

8 POINTS OF PERSPECTIVE

Given my background as a public health nurse working as a school nurse with primary school children, the perspective of health promotion focusing on children's sustained wellbeing and prosperity are inevitable. Sweden is one of few countries that have legislated school health services. Nonetheless, accessibility and provision of school nurses' services differ between counties and have been found to be inequitable (135). To ensure that all children in the Swedish school system have equal access to a school nurse's care, common national guidelines and a universal health monitoring system need to be developed. Furthermore, to enable school nurses' active participation in health promoting activities, more funding and effective programmes are needed. Today, responsibility for the medical part of school health services is allocated to the educational sector in each of the 290 municipalities, whereas child health services are centralized and organized within the health sector of the 21 counties. One solution could therefore be to have the medical part of school health services funded by the health sector rather than the educational sector. The reimbursements should then be based on, e.g., number of children registered in a certain age group, socio-economic burden, and health services provided, similar to the system used in child health services for preschool children.

On a positive note, the global and local determination and cooperation over the past few years in relation to the response to the rapidly developing COV-SARS-19 pandemic has once more proved that human adaptability and resilience can be used to conquer universal threats to health. Nonetheless, when the more rapid pandemic is contrasted to the continuously increasing pandemic of non-communicable diseases caused by unhealthy lifestyles, it is evident that the global as well as local response is vastly different. The World Health Organization (25) has repeatedly stressed that ending childhood obesity needs to be a priority and that this can only be achieved by multiple sectors in society acting together in providing adequate systems for health promotion and obesity prevention. So, one question remains: what will it take for the human community to join forces and act to ensure all children healthy lives and development, a task we are clearly capable of?

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