Abstract

Title: Promoting dietary change. Intervening in school and recognizing health messages in commercials
Language: English
Keywords: Health promotion, dietary intervention, food choice, attitudes, beliefs, school lunch, home and consumer studies, fish consumption, television food advertising, health discourse
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Sammanfattning

Syftet med avhandlingen var att undersöka faktorer som inverkar på matvanor bland barn och ungdomar med betoning på individuella faktorer, skolan samt marknadsföring av mat. En kontrollerad skolbaserad interventionsstudie med fokus på fisk utformades med hjälp av socialpsykologisk teori (Theory of Planned Behaviour) och genomfördes bland elever i årskurs åtta i Göteborgsområdet 1998-1999. Faktorer som har betydelse för att äta fisk i skolan studerades genom fokusgrupper i en skolklass (n=23) och en enkätbaserad tvärsnittsstudie vid två skolor (n=162). Elevers fiskkonsumtion i skolan mättes genom observation. I interventionsstudien deltog 228 elever från tre skolor och två olika insatser, dels förändring av skollunchen (SL) och dels förändring av skollunchen förstärkt med förändring av hem- och konsumentkunskapsundervisningen (SL+HE), jämfördes med avseende på beteende, attityder och kunskap.

Vid uppföljningen visade det sig att fiskkonsumtionen hade ökat signifikant i SL+HE-gruppen. Dessutom hade även kunskaper om fiskens näringsmässiga betydelse ökat i båda grupperna.

Förekomst och innehåll av livsmedelsreklam till barn jämfördes i elva länder: Australien, Brasilien, Kanada, Kina, Tyskland, Grekland, Italien, Spanien, Sverige, England samt USA. TV-sändningar från de tre mest populära kommersiella kanalerna bland barn 3-12 år (i Sverige TV3, TV4 och Kanal 5) spelades in mellan klockan 6.00 och 22.00 under två veckodagar och två helgdagar under en sammanhängande vecka (okt 2007 till mars 2008) (n=192 timmar). I 82 av de svenska reklamfilmerna analyserades med hjälp av diskursanalys hur mat artikuleras i hälsodiskursen.

Andel livsmedelsreklam varierade mellan 11% (Brasilien) till 29% (Grekland och Italien) (Sverige 18%). Andel reklam för 'non-core' mat (innehåller hög halt av oönskade näringsämnen och/eller energi och tillhör ej baslivsmedel) varierade mellan 53% (Australien) till 87% (Tyskland) (Sverige 63%). Över alla länder var antal reklaminslag per timme och kanal för 'non-core' mat högre under den tid då barn tittar mycket och majoriteten av de reklaminslag som innehöll övertalningstekniker gjorde reklam för 'non-core' mat. I Sverige var samtliga av de fem vanligaste livsmedelsprodukterna som gjordes reklam för när barn tittar mycket 'non-core' mat. Hälsoaspekter användes i stor utsträckning i svenska reklamfilmer; mat artikulerades som behandling eller skydd, som att känslomässigt må bra eller som omsorg En del mat som traditionellt sett anses ohälsosam (t ex hamburgermåltider, chips och feta mejeriprodukter), marknadsfördes som 'hälsosammare' genom offensiv retorik.

CONTENTS

LIST OF ORIGINAL PAPERS

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

I Prell, H. (2002). Att undersöka ungdomars attityder till skollunchen med fokusgrupper [Using focus groups to examine adolescents' attitudes towards the school lunch]. In: Shanahan, H., & Ellegård, K., (Eds.) *Kreativa metoder inom konsumentforskning i empirisk belysning [Creative methods in consumer research in an empirical light]* (Forskningsrapport 32), p. 91-103. Göteborg: Institutionen för hushållsvetenskap, Göteborgs universitet.

II Prell, H., Berg, C., & Jonsson, L. (2002). Why don't adolescents eat fish? Factors influencing fish consumption in school. *Scandinavian Journal of Nutrition, 46,* 184-191.

III Prell, H., Berg, C., Jonsson, L., & Lissner, L. (2005). A school-based intervention to promote dietary change. *Journal of Adolescent Health, 36,* 529.e15-529.e22.

IV Kelly, B., Halford, J. C. G., Boyland, E. J., Chapman, K. Bautista-Castaño,I., Berg, C., Caroli, M., Cook, B., Coutinho, J. G., Effertz, T., Grammatikaki, E., Keller, K., Leung, R., Manios, Y., Monteiro, R., Pedley, C., Prell, H., Raine, K., Recine, E., Serra-Majem, L., Singh, S., & Summerbell, C. Television food advertising to children: a global perspective. Accepted for publication in American Journal of Public Health.

V Prell, H., Palmblad, E., Lissner, L., & Berg, C. Health discourse in Swedish television food advertising during children's peak viewing times. Submitted.

ABBREVATIONS

CI	Confidence Interval
OR	Odds Ratio
ROC	Relative (Receiver) Operating Characteristic
RP	Relative Position
SL	School lunch intervention
SL+HE	School lunch and home economics intervention
TPB	Theory of Planned Behaviour

INTRODUCTION

The subject of this thesis is the promotion of dietary change among children and adolescents.[1] There are many influences on the food habits of young people, ranging from societal, political, economic structures and the media, to the physical and social environment and individual, psychological and physiological factors. In the present thesis, the potential of the school setting in health promotion is recognized as well as health messages in television food advertising. Health promotion is defined by the World Health Organization as the process of enabling people to increase control over and improve their health and focuses on achieving equity in health by creating a supportive environment, access to information, life skills and opportunities for making healthy choices. The overall aim of Sweden's national public health policy is to "create social conditions that will ensure good health, on equal terms, for the entire population" (Folkhälsoinstitutet, 2009). One of its 11 public health domains concerns eating habits and foods.

Diet plays an important role in the prevention of chronic diseases such as obesity, diabetes mellitus, cardiovascular disease, hypertension and stroke, and some types of cancer (World Health Organization, 2000, 2003). A diet with adequate nutrient intake and amount of food is a prerequisite for health and the main dietary advice to the public in Sweden is to increase fruit, vegetable and fish consumption and choose whole grain bread[2], keyhole products and liquid fat and oil (Livsmedelsverket, 2007c).

The childhood and adolescent years are formative when it comes to developing, practising and maintaining healthy eating habits throughout the life course (e.g. Kelder, Perry, Klepp, & Lythle, 1994; Nader, et al., 1999) and particularly important because of the growth-related nutritional needs (Brug & Klepp, 2007). Motivation, abilities and opportunities are important factors mediating healthy nutritional behaviours. The first area in the WHO European Action Plan for

[1] A child is defined as 3-12 years old and adolescents as 13-18 years.
[2] The bread recommendation is suggested to be reformulated to: Choose in first place whole grain when you eat pasta, rice, bread, cereals and grain (Livsmedelsverket, 2009).

Food and Nutrition Policy 2007-2012 is about supporting a healthy start (World Health Organization, 2008). The school has been recognised as an important setting for dietary interventions (World Health Organization, 2009b), reaching children and adolescents on equal terms when they are particularly malleable. However, promoting healthy eating in school is not only about teaching nutrition, but also, among other things, about creating a supportive and friendly environment by, for instance, developing and maintaining healthy meal services, which will support the opportunity to make healthy choices.

It is also important to tackle influencing factors at a macro environmental level that may act as barriers and/or opportunities for dietary change. The World Health Organization (2003, 2006b) has recognized food marketing as an important area to focus on when combating childhood obesity. The third action area in the WHO European Action Plan deals with the provision of comprehensive information and education to consumers by, for instance, ensuring appropriate marketing practices (World Health Organization, 2008). Thus, it is of great importance to monitor and critically assess the marketing of foods and beverages to children; particularly marketing by mass media and television food advertising, which influences children's dietary behaviour in many ways (Cairns, Angus, & Hastings, 2009).

The present thesis is concerned with the ways that schools can work with and promote dietary change. How can the school contribute to increasing fish consumption among adolescents and what means may be most effective? In addition, food marketing to children is addressed. What is the extent and content of television food advertising to children and what notions about health in relation to food are reproduced during periods when children tend to watch television a great deal? In order to be able to take the outlined questions into consideration, it is necessary to shed light on some of the major influences on food choice.

Food choice influences

In public health, unhealthy practices have traditionally been regarded as an individual responsibility and the result of misinformation and poor education (Murcott, 2000), and much effort has been put into informing and educating the general public about health issues. In the last decade, there has been an increased emphasis on the significance of environmental and structural factors when

explaining food choice (e.g. Larsson & Story, 2009; Story, et al., 2008; Story, Neumark-Sztainer, & French, 2002), which, as a consequence, has initiated actions on more than one level.

According to Story et al. (2008), the acquisition of food habits is a complex process that involve many factors across different contexts. An ecological framework can be used to describe the multiple conditions and food environments that influence food choice (Figure 1). The proposed ecological framework is based on Social Cognitive Theory (Bandura, 1986; Baranowski, Perry, & Parcel, 1997) and an ecological perspective (Bronfenbrenner, 1979). This framework can be useful when guiding interventions and it emphasizes factors at different levels that influence health and nutrition, people and their environment (Story, et al., 2008). *Individual level factors* include cognitions, behaviours and biological and demographic factors. Environmental contexts include *social environment* (e.g. family, friends and peers), *physical environment* (e.g. the home, work places, the school, restaurants and supermarkets) and *macro-level environments* (e.g. food marketing, social norms, food production and distribution systems, agriculture policies and economic price structures).

Health promotion during the adolescent years offers challenges depending on the multilevel factors that influence the food choice of adolescents (Story, et al., 2002). For adolescents, a number of individual factors may influence food choice such as psychosocial (e.g. food preferences, taste and sensory perceptions of food, health and nutrition, meanings of food, self-efficacy and knowledge), biological and lifestyle factors. According to Story et al. (2002), the most influential social environmental influences are the family and peers. The physical environment (e.g. schools and fast food restaurants) in the community has a major impact on the dietary behaviour of adolescents, influencing for instance food availability and perceived norms. Some of the major macro system influences in society as a whole include the media, cultural and social norms and food production systems.

Individual and social factors

A major determinant for food choice is taste or flavour (Conner & Armitage, 2002) and, indeed, many people seem to put taste and pleasure aspects above, for example, health (Cox & Anderson, 2004). Younger children base their food selection mainly on taste; they eat what they like (Birch, 1999) and this is also

true for schoolchildren (e.g. Brug, Tak, te Velde, Bere, & Bourdeaudhuij, 2008; Gummeson, Jonsson, & Conner, 1997).

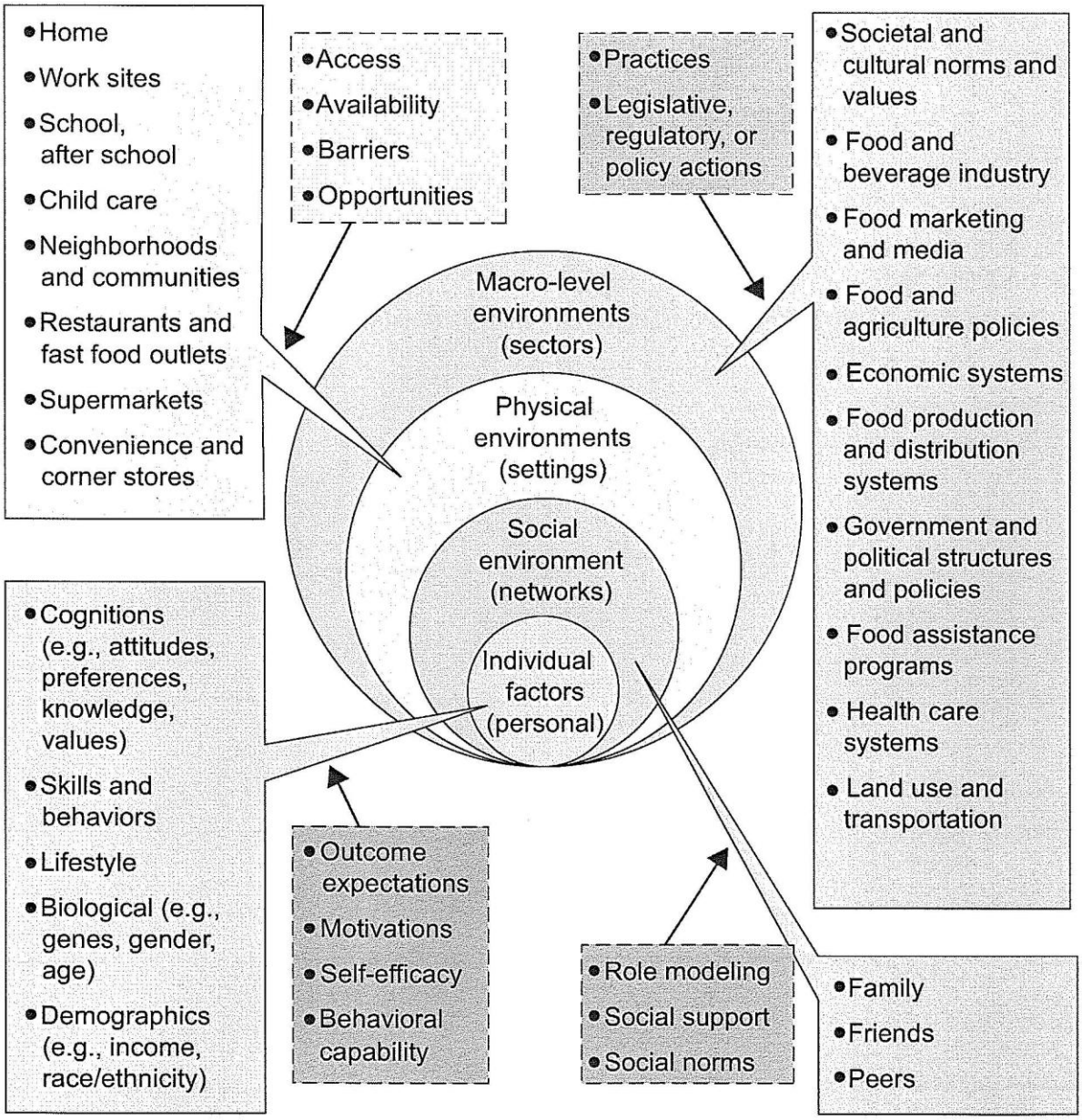


Figure 1. An ecological framework depicting the multiple influences on food choice (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008, pp. C-1).

Health aspects might also be a factor to consider with children and adolescents. The moderating effect of health beliefs on food choice may only be relevant for certain foods and differs between cultures (Cox & Anderson, 2004). For instance, in a Swedish study of schoolchildren's breakfast choices, health aspects

were considered when talking about certain foods like fibre rich bread and breakfast cereals (Berg, 2002). In a US based study, perceived benefits (i.e. health-related) such as getting energy, influencing body shape or physical condition and being healthy were acknowledged but found to belong to factors of secondary importance (Neumark-Sztainer, Story, Perry, & Casey, 1999).

It is also important to understand the symbolic meanings that adolescents attach to food. For instance, adolescent girls tend to dichotomize food into "junk" food and "real" food. "Junk" food is associated with friends (Chapman & Maclean, 1993; Prättälä, 1989) and "real" food is associated with parents and believed to be consumed at home or in school. Thus, to give up eating "junk" food would then be to give up much more than the actual food itself (Story, et al., 2002).

According to adolescents themselves, one important barrier to healthy eating seems to be a general lack of concern or urgency (Croll, Neumark-Sztainer, & Story, 2001; Neumark-Sztainer, et al., 1999; Story & Resnick, 1986). Time is another factor mentioned as well as food availability (Gummeson, Jonsson, Conner, & Svensson, 1996; Neumark-Sztainer, et al., 1999). Moreover, adolescents, especially females, may be driven by concerns about weight and body shape when choosing what to eat (Conner, Martin, & Silverdale, 1996; Wardle & Marshland, 1990; Wesslén, 2000).

The food habits of adolescents can be characterised by the weakening influence of parents, increasing social involvement with peers, and a wish to become independent (Rolls, 1988). Similar consumption of specific foods has been shown among friends (Feunekes, Graf, Meyboom, & Staveren, 1998; Williams, et al., 1993) and friends may influence foods eaten at lunchtime (Dennison & Shepherd, 1995). Due to social influences, teenagers may start to eat food that distinguishes them from adults, while at the same time tasting previously disliked foods in order to enter the adult world (Nu, Leod, & Bartelemy, 1995).

However, parents were also reported to be an important influence on adolescents' food habits (Neumark-Sztainer, et al., 1999; Wesslén, 2000). For instance, students in late adolescence claimed that any consideration of nutrition when choosing food was dependent on parents talking about nutrition in childhood (Branen & Fletcher, 1999). Parents are believed to influence adolescents' dietary habits in a direct way. Significant associations were found

between parents and their adolescent children regarding normal fat and food intake (Feunekes, et al., 1998) and parents exert an influence on school children's breakfast choices (Berg, Jonsson, & Conner, 2000). Interestingly, adolescents believe that eating together with their family would make them eat more healthy food (Neumark-Sztainer, Story, Ackard, Moe, & Perry, 2000) and healthy eating is associated with parents and being at home (Chapman & Maclean, 1993; Williams, et al., 1993).

The school arena

The school is an important arena for the promotion of health-related behaviours among children and adolescents; especially healthy eating habits (Doak, Visscher, Renders, & Seidell, 2006; Flodmark, Marcus, & Britton, 2006; French & Stables, 2003; World Health Organization, 2009b). The school could play an important role in diminishing some of the socioeconomic differences that are related to health by offering an environment that is accessible to all on equal terms. The school should support the adoption of healthy diets and physical activity since it influences the lives of most children in all countries (World Health Organization, 2009b) and it has been recognized as an important setting where behaviour can be influenced (World Health Organization, 2004). Nutrition and physical activity education are essential for the promotion of healthier diets. Increasing media literacy is also important in order to promote healthy eating by countering food fads and misleading dietary advice.

The goal of WHO's Global School Health Initiative, launched in 1995, is to increase the number of health-promoting schools (World Health Organization, 2009a). A health-promoting school can be characterised as a school constantly strengthening its capacity as a healthy setting for living, learning and working. In Sweden, the school food service and the school subject home economics[3] represent two important arenas in health promotion where healthy dietary choices could be made available, modelled and taught.

The school food service

Cooked food in schools are customary in both Sweden and Finland (Roos, Lean, & Anderson, 2002). Since 1946, hot school lunches have been served in Sweden, subsidised by the government until 1967, when municipalities became

[3] In Sweden the proper term for the school subject is "home and consumer studies" (hem- och konsumentkunskap). However, when Study I, II and III were carried out it was called "home economics" (hemkunskap).

responsible. Children of compulsory school age have by law been entitled to free school lunches in Sweden since 1997. The Swedish National Food Administration issued guidelines for school lunches in 2007 (Livsmedelsverket, 2007a), which are based on Swedish Nutrition Recommendations (Livsmedelsverket, 2005). The school meal is seen as an important part of local public health work as well as being an integral pedagogical tool within the school curriculum.

Home economics

Home economics in Swedish compulsory schools aims, according to its syllabus, to "…provide experiences and an understanding of the consequences of daily activities and habits in terms of economics, the environment, health and well-being" (Skolverket, 2000). One specific goal is to develop skills in organising, preparing and arranging meals, as well as an understanding of the importance of meals for developing a sense of community, health, communication and culture. Among other things, it is maintained that the pupils' practical skills are developed together with the ability to communicate and act, independently and together with other people. The subject's social and communicative processes in the learning that takes place have been highlighted (Cullbrand, 2003). The potential of the subject as citizenship education has also been discussed (Hjälmeskog, 2000) as well as the doing of gender in the classroom (Petersson, 2007). Most teaching of home economics in Sweden takes place in grades 7 to 9 and the major part is usually taught in the 8th grade.

School-based dietary interventions

A WHO review concluded that successful programmes in schools consisted of comprehensive, multi-component programmes targeting the school environment (food services) and classroom curriculum (World Health Organization, 2009b). Consistent improvements were seen in knowledge, attitudes and behaviour. Successful components were trained teachers that included a diet component in the curricula, parental involvement, a supportive environment and a food service with healthy choices.

School-based dietary programmes have a large potential for promoting healthy eating among children and adolescents (Bowker, Crosswaite, Hickman, McGuffin, & Tudor-Smith, 1999; Contento, et al., 1995; Contento, Manning, & Shannon, 1992; Lytle & Achterberg, 1995). However, the behavioural impact of only modifying school lunches has been shown to be minimal (Lytle & Achterberg, 1995), whereas the combination of school meal modifications and

classroom education has had positive effects (Contento, et al., 1995; Dollahite, Hosig, White, Rodibaugh, & Holmes, 1998; Liquori, Koch, Contento, & Castle, 1998; Lytle & Achterberg, 1995).

According to a review by Contento et al. (1995), some elements in particular contributed to effective nutrition education among school-age children. Successful programs were guided by appropriate behavioural theory and prior research, focusing on more specific food-related behaviours, clearly setting behaviour change as a goal and employing educational strategies directly relevant to the behaviour in focus. For behaviour change to occur and persist, interventions must also create and maintain school environments that support the behaviours that are being promoted (Nader, et al., 1999). For instance, it is important that the school canteen promotes and provides a range of healthy alternatives, since pupils who believe they have a choice have been found to be more satisfied with the school lunch (Meyer, 2000b). Also, it is important for the school food service to pay attention to the quality of the choices as well as the attractiveness of the food and the flavour (Meyer, 2000a).

Television and food advertising

Among children and adolescents, television viewing is an important leisure time activity (Swinburn & Shelly, 2008). In the US, for example, television dominates media use (Story, et al., 2002) and is the largest source of food-related messages for especially younger children (Story & French, 2004). Children are exposed to poor nutritional practices in movies, shows, cartoons and advertising that could lead to misconceptions regarding healthy nutrition (Caroli, Argentieri, Cardone, & Masi, 2004).

The World Health Organization (2003, 2006b) has recognized food marketing as an important area to focus on in the prevention of child obesity. Television food advertising influences children's food and beverage preferences, purchase requests and consumption (Cairns, et al., 2009), and regulating the marketing of energy dense foods and beverages on TV could reduce the impact of TV viewing on weight gain (Swinburn & Shelly, 2008). Studies of children have shown that commercial television viewing may produce positive attitudes towards junk food (Dixon, Scully, Wakefield, White, & Crawford, 2007), and is related to less healthy food habits (Buijzen, Schuurman, & Bomhof, 2008; Halford, Boyland, Hughes, Oliveira, & Dovey, 2007; Harris, Bargh, & Brownell, 2009). Not surprisingly, the foods that are promoted in television food advertising are

typically not those appearing in dietary recommendations and consist mainly of high-calorie and low-nutrient products (Cairns, et al., 2009).

However, it is difficult to determine the relative importance of food promotion when compared to other factors influencing dietary behaviour since sufficient data is lacking for a quantitative comparison (Cairns, et al., 2009). Nevertheless, food advertising impacts children's food behaviour significantly to a similar or greater extent than other factors that have been examined.

Health messages in television food advertising

Messages in television food advertising might be confusing by including, for instance, denigration of core foods and exaggerated health claims (Roberts & Pettigrew, 2007) or exaggerated pleasure responses to eating a food product (Page & Brewster, 2009). Interestingly, a recent US-based study of advertisements during children's programming showed that although 90 % of advertisements were for foods high in fat, sugars or sodium, or low in nutrients, almost half of all food advertisements contained health/nutrition or physical activity messages (Batada, Seitz, Wootan, & Story, 2008). The different appeals, mainly with foods high in undesirable nutrients, that children are exposed to in television food advertising might prevent them from processing relevant product information and assessing messages critically (Warren, Wicks, Wicks, Fosu, & Chung, 2008). If health professionals are to involve children in critically evaluating health-related messages in television food advertising, it is important that these are thoroughly examined.

The nature and extent of Swedish food marketing to children

The Swedish Consumers' Association carried out a study in 2005 including a follow-up in 2007 of the nature and extent of marketing directed at children that promoted unhealthy foods (Sveriges Konsumenter, 2007, 2008). The study included television, direct mail, children's magazines and the Internet. Unhealthy foods were defined as soda and sweet beverages, cookies and pastries, sweet desserts and snacks (ice-cream, chocolate pudding, jam and marmalade) candy, potato crisps and chocolate.

Regarding television food advertising, four channels were examined (TV3, TV4, Kanal 5 and Cartoon Network) and altogether 72 hours of television were recorded on two weekdays and one weekend day. In 2005 (November), 2,275 advertisements were detected and only 9% of those was for food, while in 2007

(March), 1,387 advertisements were found of which 20% was for food[4]. In total 32% of all food advertising in 2005 was for unhealthy foods (according to the definition used) and in 2007 it was 26%.

In the case of marketing by direct mail in 2005, foods were the largest group, promoted by 18% of all advertisements and unhealthy foods were present in 18% of those. Follow-up in 2007 showed similar results. As regards children's magazines only a few cases of food advertisements were present, which promoted candy and fast food. In the case of food advertising on the Internet 2005, food advertisements were present in 64% of the 227 screen shots from food related web sites and half of those were for unhealthy foods. In the case of web sites mostly visited by children, 13 of the 50 screen shots contained food advertisements (about half were for unhealthy foods). At follow-up in 2007, 88 web sites were selected. In 28 of the 47 food-related web sites, food advertisements were found and 11 of those contained unhealthy foods. Food was promoted in 7 of the 41 web sites mostly visited by children, and 4 of those contained unhealthy foods. At follow-up, the web sites more often displayed an advertising sign that made it easier for children to identify advertising.

Television regulations for advertising to children in Sweden

The Radio and Television Act (1996:844) regulates television advertising aimed at children in Sweden[5]. According to these regulations, commercial advertising in a television broadcast may not be designed to attract the attention of children less than 12 years of age (Chapter 7, Section 4). Furthermore, individuals or characters who play a prominent role in programmes that are primarily aimed at children less than 12 years of age may not appear in commercial advertising in a television broadcast. The act also states that commercials may not be broadcast immediately before or after a programme or part of a programme that is primarily aimed at children less than 12 years of age, unless this involves messages referred to in Section 8[6] (Chapter 7, Section 7b). Apart from the Radio

[4] The large difference in total number of advertisements between the two measurement occasions are explained by damaged recordings.
[5] These regulations only apply to channels broadcast from Sweden (e.g. TV4). For other channels, such as TV3 and Channel 5, the regulations of the broadcasting country apply.
[6] Section 8: If the cost of a non-advertising programme has been paid for in whole or in part by a party other than the person or entity conducting broadcasting activities or producing audio-visual works (sponsored programmes), the identity of the sponsor(s) shall be stated in an appropriate manner at the beginning or the end of the programme, or both. A message of this nature shall be constantly displayed on searchable teletext. A programme that primarily involves news or current affairs may not be sponsored.

and Television Act, advertising is also regulated in the Marketing Practices Act (2008:486), where unfair marketing is considered. Moreover, International Chamber of Commerce (ICC) has developed and stipulated ethical rules for industry self-regulation, in which marketing to children are also considered (International Chamber of Commerce and ICC Sweden, 2007).

AIMS

The general objective of this thesis was to examine individual and environmental influences on dietary change among children and adolescents with particular attention paid to the school setting and food marketing.

The specific aims were

- to study cognitive factors (e.g. attitudes, beliefs, social norms and perceived control) that influence adolescents' fish consumption in school

- to design, implement and evaluate two interventions with the aim of increasing adolescents' fish consumption in school, comparing the contribution of school lunch modifications with and without changes in the home economics syllabus when influencing behaviour, attitudes and knowledge

- to determine and compare the frequency and nature of television food advertising to children in a range of countries and to assess the use of persuasive marketing techniques

- to analyse how food is articulated in the health discourse in commercials during children's peak viewing times in Sweden

THEORIES AND METHODS

The present thesis investigates influences on dietary change among children and adolescents, using different approaches. In order to address the aims, it was necessary to carry out both quantitative and qualitative data collection and analysis. Moreover, when developing the school-based intervention and analysing health messages in commercials, I have used theories and assumptions that rest on different ontological and epistemological grounds, which ultimately influence methodological tools and procedures. On the one hand, individual cognitions (e.g. thoughts and feelings) were examined from a social psychological point of view, and on the other, health messages in food commercials were analysed from a discourse analytical perspective. I am aware that these orientations might seem far apart or even perhaps incompatible (had they been applied in the same analysis), but I argue that these approaches are necessary and most appropriate for the different research questions that are dealt with.

Two different approaches

Social psychology and dietary change (Papers I, II and III)

To inform the development of the school-based intervention with a focus on increasing the consumption of fish among adolescents, a comprehensive study of underlying factors of importance was carried out. A social psychological approach was applied both in the design process and when evaluating the intervention.

When trying to understand influences that may facilitate dietary change among adolescents, a social psychological approach could be suitable. The social psychology of food is concerned with how people's thoughts, feelings and behaviour impact on food choice, and how interaction with others and the social environment is likely to influence food consumption (Conner & Armitage, 2002, p. 2). According to Conner and Armitage (2006), social psychological research

provides the best explanation of why people choose the food they do and the impact of physiological processes on food choice are likely to be mediated by social psychological variables. In addition, social psychological variables can often be manipulated in interventions aiming at dietary change which is why it may be suitable in the context of dietary change. A social cognition model, the Theory of Planned Behaviour (TPB; Ajzen, 1988, 1991), was applied in the intervention process. Social cognition models focus on understanding people's behaviour by investigating their *beliefs* about their behaviour in a social context (Rutter & Quine, 2002). It is thus people's perceptions of reality rather than objective descriptions of reality that are in focus.

Theory of Planned Behaviour

The Theory of Planned Behaviour is an extension of the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) and the main difference is that TPB also takes into account behaviours that are not under complete volitional control (Ajzen, 1988). According to TPB, behaviour can be predicted by a person's *intention* to engage in a specific behaviour and his or her actual control over the behaviour (Ajzen, 1991). In practice, *perceived behavioural control* is used as a substitute for actual control. Intention is a motivational factor that determines how much effort people are willing to exert to perform a specific behaviour. Perceived behavioural control reflects the perceived ease or difficulty of performing the behaviour and refers to both internal (e.g. skills) and external (e.g. availability) control factors. Intention, in turn, is determined by the person's *attitude toward the behaviour* (favourable or unfavourable evaluation of the behaviour), *subjective norm* (perceived social pressure to perform or not perform the behaviour in question) and perceived behavioural control. Thus, according to TPB, "/…/ people intend to perform a behaviour if their personal evaluation of it is favourable, if they think that important others would approve of it, and if they believe that the requisite resources and opportunities will be available" (Ajzen, 1988, p. 144). TPB is based on the principle of compatibility, which means that correspondence between attitude and behaviour will be highest when measured at the same level of specificity with respect to action (e.g. eating), target (e.g. fish), context (in the school canteen) and time (e.g. tomorrow) (Conner & Sparks, 1996).

The route to understanding (and influencing) behaviour lies in assessing the salient underlying *beliefs* (behavioural, normative and control beliefs) that are assumed to influence attitudes, subjective norms, perceived behavioural control and intention to perform a certain behaviour (Ajzen, 1991). A belief represents

the information that a person has about an object; it links an object to some attribute (Fishbein & Ajzen, 1975, p. 12). Beliefs are regarded as "the fundamental building blocks in our conceptual structure" (Fishbein & Ajzen, 1975, p. 14). This view is based on the assumption that human beings behave rationally upon careful consideration of existing information to form evaluations and make decisions. In line with an expectancy-value approach (Conner & Armitage, 2006), each behavioural belief is combined with a subjective evaluation of the belief's attribute, and normative beliefs with motivation to comply with the referent in question (Ajzen, 1991). An important point to note is that, for instance, a person's attitudes toward an object is made up of a *set* of behavioural beliefs about the object and not one specific belief (Fishbein & Ajzen, 1975).

The TPB has been used to investigate factors influencing various health behaviours including smoking, alcohol consumption, exercise and diet (Conner & Sparks, 1996). Studies have, for instance, applied TPB to seafood and fish consumption (e.g. Tuu, Olsen, Thao, & Anh, 2008; Verbeke & Vackier, 2005). Research has been carried out to examine food choices from a health perspective using this model, both among adults (e.g. Conner, Norman, & Bell, 2002; Conner & Sparks, 1996) and adolescents (e.g. Berg, et al., 2000; Conner, Martin, & Silverdale, 1996; de Bruijn & van den Putte, 2009; Dennison & Shepherd, 1995; Gummeson, et al., 1997). Additional variables in the model have been tested and modifications of the model have been made; for example, a descriptive norm (the perception of how other people behave) was successfully added to the model in studies with schoolchildren and adolescents (Berg, et al., 2000; Dennison & Shepherd, 1995).

Connor and Armitage (2002, p. 92) argue that before conducting a TPB-based intervention, an empirical study should first determine which TPB-variables are most predictive of intention and behaviour and then identify the salient beliefs that would be most effective to aim at changing. To promote behaviour change, Fishbein and Ajzen (1975) propose that an individual's salient underlying beliefs should be targeted either by introducing new salient beliefs or by changing existing beliefs. Beliefs could be influenced in two ways; either by direct observation that an object has a certain attribute (e.g. active participation) or by communication (e.g. persuasive communication).

However, according to a systematic review, it was not very common to actually use the TPB to develop an intervention (Hardeman, et al., 2002). Rather, the TPB model was used to measure process and outcome variables and to predict intention and behaviour. One reason might be that TPB is likely to be time-consuming when applied fully and thus expensive (Conner, et al., 2002). Social cognition models have also been criticized from a conceptual point of view (Ogden, 2003). For instance, few studies use an objective measure of behaviour and a high correlation between self-reported behaviour and cognitions might therefore be expected.

In conclusion, a TPB-based dietary intervention should clearly delineate what behaviour and target it aims at and in what context and when. It is also important to devote adequate time and effort to collecting information about the underlying beliefs in the target group and use this information in order to design a well-founded intervention.

Stages of Change

In addition to applying the Theory of Planned Behaviour in the dietary interventions, another cognitively based social psychological model, the Transtheoretical Model (TTM), was used as an evaluation instrument. The model is an integration of some major theories in order to account for the complexity of behavioural change and create a more comprehensive model (Prochaska, Redding, & Evers, 2002). The underlying assumption of the Transtheoretical Model is that behavioural change is a dynamic process (Prochaska & Clemente, 1982; Prochaska, Diclemente, & Norcross, 1992). Originally, the model was developed to describe cessation of addictive behaviours (e.g. smoking), but has also come to be used to predict acquisition of healthy behaviours (Prochaska, et al., 1994). The model has, for instance, been used with dietary change such as dietary fat reduction and increasing fruit and vegetable consumption (Shepherd, 2006).

The core constructs that belong to the model are termed Stages of Change, decisional balance, self-efficacy[7] and processes of change (Prochaska, et al., 2002). Stages of Change is a central construct that describes behavioural change as a process in which time is involved (Prochaska, et al., 2002). According to this construct, people move through a series of six stages in order for behaviour

[7] Self-efficacy is a construct that was adopted from Bandura (1986) and integrated into the TTM model. To have self-efficacy is to have confidence in one's own ability of performing a specific behaviour, also when dealing with tempting situations.

change to occur. In the *precontemplation* stage people have no intention of changing their behaviour in the near future, usually measured as within six months. In the *contemplation* stage people think about changing their behaviour in the future (within six months). People then move to the *preparation* stage where they plan to change their behaviour in the near future (the next month) and may already have made some small changes. People who are believed to have quite recently changed their behaviour are in the *action* stage and, if maintained for more than six months, they will belong to the *maintenance* stage. *Termination* is the final stage in which people practice new habits successfully with total self-efficacy without relapse.

Decisional balance is a person's weighing of the pros and cons of changing behaviour (Prochaska, et al., 2002). The basic idea of TTM is that people apply different processes of change (overt and covert activities) to move from one stage to another. These processes can inform intervention programmes (Prochaska, et al., 2002). However, behavioural change is by no means always an entirely linear process. Relapse is common and people may also skip a stage. One important contribution of the model is the tailoring of educational strategies in the various stages of change.

Discourse analysis and health (Paper V)

A discourse analytical perspective was applied in order to analyse how food was articulated in the health discourse in television food advertising during children's peak viewing times. Discourse analysis consists of different approaches that each combine theoretical and methodological insights into an integrated whole, but also share some common social constructionist assumptions (Burr, 2003; Winther Jørgensen & Phillips, 2002). According to Winther Jørgensen and Phillips (2002, p. 1), discourse can be understood as 'a particular way of talking about and understanding the world (or an aspect of the world)'. Discourses offer limited ranges of possible statements in specific situations (Winther Jørgensen & Phillips, 2002, p. 157), which are constructed and reproduced in social processes.

The role of language in this process is fundamental, 'language provide the basis for our thought' (Burr, 2003, p. 62). It is through language that the world is constructed by the concepts and categories that we use and the meanings that we ascribe them. Discourse offers a shared common understanding, but there are always a multitude of alternative versions available through language, restricted by the historical and cultural background. Thus, accounts and descriptions are

never final; they could at all times be given differently and are therefore set in an argumentative and rhetorical context. However, language is not a passive reflection of the world but should be seen as action; language constructs reality in the naming of objects (Börjesson & Palmblad, 2007).

In the current analysis, we were influenced by the two discourse analytical perspectives discourse theory and discursive psychology from which theoretical tools were borrowed that were applicable in the analysis. However, although analytical focus and the view of the role of discourse in the world may differ between discourse theory and discursive psychology, Winther Jørgensen and Phillips (2002) claim that it is possible to combine elements from different discourse analytical perspectives (and non-discourse analytical perspectives) to form "one's own package" (p. 4).

Discourse theory

According to discourse theory meaning is achieved through *articulation* (Laclau & Mouffe, 2001, p. 105). Elements (everything outside the discourse) gain meaning through the practice of articulation and eventually become moments in a discourse. Articulation is defined as a practice that establishes a relation among elements such that their identity is changed as a result of this practice (Laclau & Mouffe, 2001, p. 26). All signs in a discourse are moments that obtain their meaning in relation to each other and *discourse* is understood as the fixation of meaning within a particular domain (Winther Jørgensen & Phillips, 2002, p. 26). In discourse theory, all social phenomena are viewed as discursive constructions (Laclau & Mouffe, 2001, p. 107). Every social practice will therefore in some way become articulatory and specific articulations reproduce or challenge the already existing discourses by fixing meaning in different ways (Winther Jørgensen & Phillips, 2002, p. 29). In our analysis, food is regarded an element that acquires meaning through articulation in order to become a moment in an overall health discourse and it is the practice of articulation in television food advertising that is critically examined.

However, according to Laclau and Mouffe (2001, p. 112) ultimate fixation of meaning is impossible, fixations are always *contingent*, i.e. all discursive constructions are possible but not necessary (Winther Jørgensen & Phillips, 2002, p. 25). Discourse analysis tries to show that any given organisation of the world (fixation of meaning) has social consequences and it is by analysing what possible meanings are excluded in relation to any established discourse that social consequences can be brought to light.

The concept *field of discursivity*, used by Laclau and Mouffe (2001, p. 111) to denote all other possible meanings that are not partly fixed in a discourse, is criticized by Winther Jørgensen and Phillips (2002, p. 56), who instead introduce the concept *order of discourse* and refer to the social space that different discourses in the same domain struggle to fill with meaning. We have used the expression *discourse types* to denote the different discourses that are at work in the broader, overarching health discourse in commercials. There are always several conflicting discourses present which can be subject to hegemonic processes and interventions so that only one particular discourse may be naturalised and prevail (Winther Jørgensen & Phillips, 2002, p. 40).

The theoretical tools *nodal points*, *articulation, chains of equivalence* and *floating signifiers* were used in the analysis of the health discourse in the commercials. *Nodal points* represent privileged discursive points (key concepts) of partial fixation around which the discourse is organized (Laclau & Mouffe, 2001, p. 112) and nodal points are filled with meaning by the practice of *articulation* (p. 105). Discourses link together elements in *chains of equivalence* to establish key elements (i.e. nodal points) relationally (Laclau & Mouffe, 2001, p. 127). *Floating signifiers* represent signs that are articulated differently in different discourses; they are signs that are particularly open to different meanings and they belong to the ongoing struggle between different discourses (Winther Jørgensen & Phillips, 2002, p. 28f). The sign body, for example, is a nodal point in medical discourse, and a floating signifier in relation to both a medical and an alternative treatment discourse, through which it is articulated differently.

Discourse theory traditionally focuses on critically analysing political ideologies (e.g. Marxism), processes and power relations critically. Discourse theory was used in a previous study to problematize health services as politico-hegemonic articulations, designed to achieve complete physical, social and mental well-being (Harding, 2005). Moreover, Wreder (2008) carried out an analysis of the discourse on good care in Swedish geriatric care. She analysed how the discourse on 'good care' was articulated by the three nodal points 'homeliness', 'familiarity' and 'talking' but also possible meanings that were excluded. In the present study, the articulation of food in the health discourse was problematized and analysed critically in the light of nodal points in the health discourse, as were possible excluded meanings and social consequences.

Discursive psychology

In order to analyse how the health discourse was constructed rhetorically to appear credible, concepts from Potter (1996), who has analysed how people negotiate and formulate descriptions in social interaction from a discourse psychological point of view, were used. One example of applying this orientation is a study on how people discuss the possible negative health consequences of complying with a vegan diet in an Internet forum (Sneijder & te Molder, 2004). The study focuses on how participants manage issues of health and accountability in interaction by rhetorically constructing a particular orientation to health. In the same way, we believe that the food industry manages health-related aspects in food marketing, especially with foods that traditionally bear unhealthy connotations, by rhetorically building up alternative versions of health. Thus, formulating descriptions is never neutral as it involves the business of categorization; some things are highlighted in a description while others are omitted. According to Potter (1996, p. 107), a description could be considered as *offensive rhetoric* when it undermines conflicting accounts. The business of marketing foods, traditionally considered to be unhealthy, in a health discourse is labelled as *offensive rhetoric*. Discursive psychology has mainly been used to analyse people's talk in interaction (interview data) but there are also examples of analyses of text and images (monologues) as in a study on advertising and aesthetic surgery in Sweden (Andersson, 2005).

The school setting

Factors influencing adolescents' fish consumption in the school canteen were examined by means of an explorative study and a cross-sectional study, which also included a methodological study. An intervention study, with the aim of increasing adolescents' fish consumption in the school canteen was developed, implemented and evaluated. Pupils in grade 8 (age around 14 years) at schools in the Gothenburg area participated in the studies, which were performed during the years 1998-1999. An overview of studies is given in Table 1. The schoolchildren and their parents received written information about the studies, which also stated that participation was voluntary and that responses would be treated confidentially. The Ethics Committee at the University of Gothenburg approved the studies.

Table 1. Overview of studies related to adolescents' fish consumption in school.

Study	Data collection	Participants	Paper
Explorative study	Focus groups	n=23 pupils at 1 school	I
Methodological study	Questionnaire	n=147 pupils at 2 schools	II
	Weighing and observation	2 observers of 100 test portions	
Cross-sectional study	Questionnaire Dietary assessment	n=162 pupils at 2 schools	II
Intervention study	Questionnaire Dietary assessment	n=228 pupils at 3 schools	III

Explorative study (Paper I)

Design, participants and data collection

Qualitative focus group discussions were held with adolescents to explore salient beliefs related to fish consumption in school. Three groups from one 8th grade class (n=23) participated. The school was not included in the other studies. One group was mixed and the other groups consisted of girls and boys, respectively.
Discussions were led by a moderator with an assistant taking notes present (the present author). The adolescents were asked to discuss various aspects of fish and to freely associate. They were also asked to discuss fish in the school canteen, what fish they like and do not like, what would make them eat more

fish in school and what could be improved. Group interaction was promoted by trying to engage the less verbal pupils. The discussions lasted about 20 minutes and were tape-recorded.

Analysis

The aim of the analysis of the focus group discussions was to examine adolescents' concerns, needs, motives and attitudes regarding eating fish in school and to identify salient behavioural and control *beliefs*. The three interviews were transcribed and the transcriptions were searched for topics. Every topic that was discussed was labelled with an appropriate concept. Similar concepts were grouped together, after which a number of significant themes emerged. Quotations from the three groups that belonged to the themes were then identified by rereading the transcripts. If all groups mentioned certain themes, these were considered especially important.

Methodological study - questionnaire (Paper II)

Design

Results from the focus group discussions were used to develop a questionnaire based on the Theory of Planned Behaviour. The TPB-items measured intention, attitudes, subjective norm (significant others' opinion) and descriptive norm (perception of friends' behaviour), perceived control and underlying beliefs and evaluations. In addition, the questionnaire contained background variables and questions about how often the pupils went to the school canteen in general, attitudes towards fish in general, fish consumption at home, Stages of Change-items and nutritional knowledge about fish.

Attitudes towards eating fish in the school canteen were measured by one item with two different seven grade response scales: *Eating most of the fish meals in the school canteen is to me*…(not important at all - very important) and (very bad–very good). Likewise, attitudes towards eating fish *in general* were measured by: *Eating fish is to me*…and the above mentioned response scales. For a complete summary of TPB items and response scales, see Paper II.

The Stages of Change items were developed from a staging questionnaire by Lamb and Sissons (1996). Participants categorised themselves as regards readiness to change (Stages of Change) by selecting one of the following five statements: *I do not eat any of the fish meals served in school and I am not thinking of tasting any* (precontemplation), *I do not eat any of the fish meals served in school but I am*

thinking of tasting them (contemplation), *I occasionally taste the fish meals served in school. I only eat a few of the fish meals served in school* (preparation), *I eat several of the fish meals served in school (more than a taste) and have done so for less than half a year* (action), *I eat several of the fish meals served in school (more than a taste) and have done so for more than half a year* (maintenance).

Nutritional knowledge about fish was measured by ten items, each with a seven grade response scale (definitely no – definitely yes). For a summary of nutritional knowledge items, see Table 4.

Reliability

Test-rest reliability for TPB-items was assessed by Spearman rank correlation with an interval of 1 week for pupils participating in the cross-sectional study (n=162). The questionnaire was completed twice by 147 (91%) of the participants. For intention, attitude, subjective and descriptive norms and perceived control, the correlation between the two occasions varied between 0.54 and 0.87. For behavioural beliefs and evaluations, correlation varied between 0.54 and 0.78 and for control beliefs between 0.50 and 0.80.

Methodological study – dietary assessment (Paper II)

A dietary assessment method based on structured observations of pupils' fish consumption in the school canteen was developed, which was pre-tested in the cross-sectional study (Paper II) and modified to improve reliability. Prior to conducting dietary assessment in school, a validation and reliability study of the two observers' (the present author and an assistant) judgements of portion sizes was carried out.

Validation and reliability

Inter-observer agreement was tested for 100 test portions. The size of a portion was determined on the basis of guidelines from the Swedish National Food Administration (Livsmedelsverket, 1992). Two kinds of fish meal in three portion sizes were assessed. Observed portion size was compared to actual weight and the two observers' individual assessments were compared with each other. Percentage agreement for observed portion size compared to the weighed portions was 84% and inter-observer agreement was 80%.

Cross-sectional study (Paper II)

Design, participants and data collection

To study factors that influence pupils' fish consumption in school, a cross-sectional study that included a questionnaire based on TPB and dietary assessments of fish consumption in the school canteen was carried out. All pupils (n=167) in six 8th grade classes at two schools were asked to fill in the questionnaire during school hours and to take part in dietary assessments when fish was served in the school canteen. The questionnaire was administered by the present author and dietary assessment was carried out by the present author and an assistant. In total, 162 pupils (97%) completed the questionnaire and 150 pupils (90%) took part in dietary assessments.

To obtain a measure of pupils' usual behaviour the observations took place four times. Dietary assessment started one week after the questionnaires had been distributed and consisted of measurements of pupils' fish consumption intake once a week on four consecutive weeks. Pupils were excluded from the dietary study if absent or if data on either served portion or leftovers were missing on two or more of the four measurement occasions. The dietary assessment aimed to categorize the pupils as 'non-eaters', 'tasters' and 'eaters' of fish. One person observed the served fish component on each of the pupils' plates, and the other person observed any leftovers. Each observer had plates with weighed portion sizes to compare visually with the portion size on the pupils' plates. Individual portion sizes were marked on a list with the pupils' names. The result of each of the measurements was then combined into an overall assessment of pupils' usual behaviour.

Pupils who had eaten more than half a portion at least *twice* in the four measurements were categorized as 'eaters'. All those who had taken fish at least once during the four lunches were categorised as 'tasters'.

Statistical methods

Spearman rank correlation was used to examine the associations between the variables in the TPB-model. The prediction of behaviour (fish consumption) by the independent variables intention and perceived control and the prediction of the intention to eat fish by the original variables of the TPB (attitude, subjective norm and perceived control) extended by a descriptive norm, were tested in a logistic regression model by means of odds ratio (OR). Differences in beliefs

between resisters (non-eaters and tasters) versus eaters of fish were demonstrated in box-plots and examined by the Mann-Whitney U test.

Intervention study (Paper III)

Developing two interventions

The results from the cross-sectional study were used to develop two school-based interventions. The major components of the interventions are shown in Table 2. The interventions aimed at individual and environmental factors, and included the school canteen and home economics instruction.

The school lunch intervention focused on the preparation and appearance of the fish meals and on extending the choice. The intervention included a one-day training session for the school food service personnel in cooking fish. Preparation, the measuring of temperature in order not to overdo the fish and garnishing were emphasised. Also, the choice of fish was extended so that apart from the normal menu, which mostly consisted of one fish meal, smoked mackerel and/or different types of pickled herring (traditional Swedish food) were served. Extra effort was put into the preparation of side dishes and accompaniments. At least two different sauces were offered, and it was decided that the potatoes would be boiled in several batches to be as fresh as possible. To encourage consumption of the fish meal of the day, the personnel prepared a nicely garnished plate with fish and accompaniments that was displayed to the pupils. Furthermore, the school canteen was decorated with a fish theme. The pupils also had the opportunity to vote for one fish meal (of ten suggested) that they would like to have. The winning meal was served once during the intervention period and once during post-test dietary assessment.

Table 2. Major components of the interventions.

School lunch component[a]	Classroom component[b]
• Personnel took part in a one-day training session in preparing fish	• 5 classroom cooking experiences focusing on fish instead of the usual 3
• Alternative dish was always served: either smoked mackerel or pickled herring	- One cooking experience was devoted to the fish dish voted for by the pupils
• Dishes were attractively garnished with lemon, dill or parsley	- One lesson about nutrition and fish
• Accompaniments were improved: -two sauces instead of one -freshly boiled potatoes	- One lesson when a fish retailer informed the pupils about different fish species and how to fillet them
• A prepared portion of the fish meal was displayed to the pupils	- Slides about cooking fish in the school canteen kitchen were shown to the pupils
• The school lunchroom was decorated with fish-related objects	- Each pupil selected a fish-related topic and wrote a small essay about it
• The students voted for a fish dish to be served at intervention and at follow-up (i.e. on a normal fish-day)	

[a]School lunch intervention (SL) included only the school lunch component
[b]School lunch + home economics intervention (SL+HE) included both the school lunch component and the classroom component

The home economics part of the intervention SL+HE consisted of theoretical lessons and actual food preparation in the classroom. The pupils in the intervention SL+HE group took part in five food preparation occasions with fish instead of the usual three. One of those occasions was devoted to preparing the winning fish meal from the voting. The pupils also had one lesson about the nutritional benefits of eating fish. In order to show the care that the personnel put into preparing the fish, slides from the school canteen kitchen, with the school food service personnel preparing fish, were shown to the pupils. Furthermore, a fish retailer came to the classroom and demonstrated and talked about different fish species and how to fillet them (1 lesson). Finally, each pupil selected a fish-related topic and wrote a small essay about it. Showing slides from the work in the school canteen kitchen could be one way of reducing the distance between the school canteen kitchen and the customer. Unfortunately, it

was not possible for the pupils themselves to visit the kitchen or to take part in the work during the intervention period.

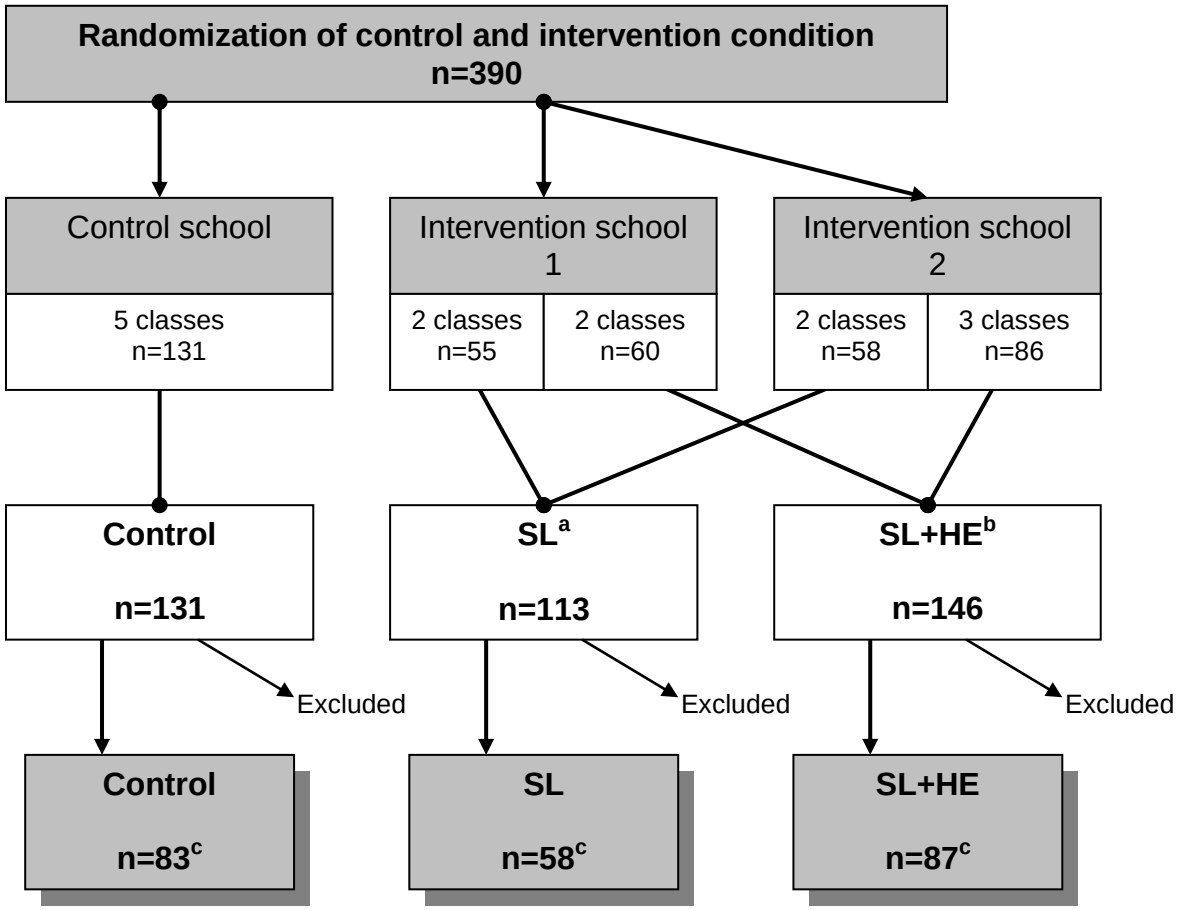
Design, participants and data collection

A controlled intervention study was performed during one school year (September 1998 - June 1999) at three schools. Schools were selected so as to be similar regarding number of pupils, socioeconomic characteristics, kitchen facilities, serving systems and willingness of school foodservice personnel and home economics teachers to engage in the study. In total, all 8th grade pupils from 14 classes (n=390; 47% girls and 53% boys) were willing to participate in the baseline study. The schools were randomly assigned to either control or intervention group. At both intervention schools all 8th grade pupils participated in the intervention in the school canteen (SL), while 2 classes from one school and 3 classes from the other also participated in the extended home economics intervention (SL+HE) (Figure 2). The classes were assigned to either intervention group based on convenience without any knowledge of the identity of the pupils. The home economics teachers were presented with pupils' self-reported Stages of Change at baseline with the suggestion that pupils belonging to different stages should be mixed in the working teams. The basic assumption was that pupils at higher stages (that probably holds a more positive attitude towards fish) would act as peer models and as such become a resource during home economics lessons.

At baseline (September 1998) and follow-up (March 1999), the subjects completed a questionnaire. The follow-up questionnaire was distributed when the home economics part (HE) of the SL+HE intervention ended. The school lunch intervention (SL) continued until the end of term. During both measurement periods, fish consumption assessments in the school canteen setting took place five times (once a week) when fish was served. The dietary assessment started in the weeks after the questionnaires had been distributed.
Respondents in the control school received no intervention but filled in the questionnaire at both baseline and follow-up and participated in the dietary assessment.

Non-participants included pupils who, on three of the five measurement occasions, were absent or if data on served portion or leftovers were missing. The percentage of participants excluded due to not fulfilling the criteria of being observed eating fish in the school canteen ≥ 3 times at both pre- and post

measurement was 42%, leaving 58 pupils in the SL group, 87 pupils in the SL+HE group and 83 pupils in the control group (at one school only) (Figure 2).



[a]SL consists of modifications of the school lunch.
[b]SL+HE consists of modifications of the school lunch together with modifications of the home economics syllabus.
[c]Number participating in at least 3 measures of fish consumption at pre-intervention and 3 measures at post-intervention.

Figure 2. Diagram illustrating the study including randomization, interventions, number of schools, classes, dropouts and number of participants in each group.

To be categorized as an 'eater' one must have eaten more than half a portion at least *three times* during the five times measurement took place, and to be a "taster" one must have taken part of the serving, not exceeding half, at least once. To evaluate the dietary assessment in the intervention study, group interviews were carried out with one group from each school of around eight to ten pupils each. All pupils claimed that they behaved as usual, in spite of two people 'checking' their intake, and maintained that they did not feel ill at ease when being observed.

Statistical methods

All data were considered to be on an ordinal level scale. Therefore, non-parametric methods were employed.

Chi square and Kruskall-Wallis tests were performed on baseline data to analyse differences between control and experimental groups. Changes in knowledge between baseline and follow-up were examined by the McNemar test (for each individual item) and Wilcoxon Signed Ranks test (for total knowledge). Differences between the groups regarding knowledge were examined by the Mann-Whitney U test and Kruskall Wallis test. A significance level of 5% (two-sided test) was used. Using similar methods, gender differences in knowledge were also examined at baseline and follow-up.

To evaluate behavioural change a non-parametric statistical method developed by Svensson (1998) was employed. This method has previously been described and used in studies examining food choice by children (Berg, 2003; Jonsson, Gummeson, Conner, & Svensson, 1998) and is considered appropriate for all types of ordered data without assumptions regarding the distributions. The method distinguishes systematic differences between paired ordered categorical assessments from the random component of variability. Systematic disagreement between baseline and follow-up is illustrated by plotting so-called ROC (relative/receiver operating characteristic) curves. It is visually easy to determine from the shape of the ROC curve the extent and location of any systematic disagreements in categories (i.e. non-eater, taster and eater). Total agreement means that there is no systematic change between baseline and follow-up and the ROC curve will be located on the diagonal of identical co-ordinates. A systematic change towards increased fish consumption at follow-up will result in a ROC curve that deviates below the diagonal of agreement and vice versa. This is a sign of systematic disagreement in position, which is expressed by a measure called Relative Position (RP). RP can have values between –1 and 1. Values close to zero indicate lack of systematic disagreement between baseline and follow-up. Moreover, 95% confidence intervals for the measures were computed and compared for the three groups (control, SL and SL+HE). Gender differences regarding behavioural change were analyzed similarly. Data were analysed using SPSS version 10.0 (SPSS, 1999).

Television food advertising

International comparative study (Paper IV)

This section will be published at the same time as Paper IV in the autumn 2010.

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Discourse analytic study (Paper V)

Material

The way that food was articulated in the health discourse in television food advertising during children's peak viewing times were analysed in a Swedish sub sample of the recorded television data. The 66 hours of recordings during children's peak viewing times in Sweden were screened and 2,409 advertisements were present in the sample of which 17.6% were for food. Among these, 99 different food advertisements were detected. After excluding short advertisements showing just the brand, supermarkets that advertise several products, shorter versions with the same content as their longer equivalent and identical commercials (i.e. for the same product but with a different taste), 82 different commercials promoting 64 food products remained, ranging from 5 to 45 seconds in length and each shown 1-14 times (Appendix 1).

The commercials were viewed using VLC Media player 0.8.6c (Wikiware, 2008) and then transcribed with respect to spoken words (both talking persons and voiceovers), written text and the scene.

Analytical process

Identifying an overall health discourse

The transcriptions were screened for aspects that contained physical, mental and social dimensions of health in line with WHO (2006a). Commercials were included in discourse analysis if

- consumption of the food was either clearly declared (in text or voiceover) or shown (in the scene) to have certain effects related to health in a broad sense, e.g. acting as treatment or creating positive relationships between people, and if evidence of the effects was shown in a convincing way.
- they contained a recognized marker for well-being such as achieving happiness and other positive feelings, or clearly emphasized content of nutrients, fruits, vegetables or natural ingredients (implying that it is healthy and/or nutritious).

We did not include commercials that only showed attributes such as sport, physical activities, fruit or vegetables or food that looked appetizing. In total, 58 commercials (71%) used health aspects to promote foods.

Bringing together health discourse types

The discourse analysis was carried out in two steps. In the first step, health discourse types in the overall health discourse were brought together by using tools from discourse theory (Laclau & Mouffe, 2001). Heath discourse types were identified by discerning *nodal points* and *chains of equivalence* and analysing how food was *articulated*. We also found elements that were articulated differently in relation to the identified discourse types, i.e. *floating signifiers*. The identification of nodal points, chains of equivalence and floating signifiers was the result of careful reading and rereading of transcripts together with watching the commercials. The use of food and health related concepts, attributes, symbols, metaphors and images to produce different versions of health were discussed by the authors. The formulation of discourse types was tested and reformulated in an iterative way and reformulation was guided by reading, watching the commercials, recoding of transcripts, testing of concepts and discussions in the group. Analysing the empirical material was a process in which the whole was related to the part and the reverse.

Identifying offensive rhetoric

In a second step, rhetorical aspects were identified and analysed using tools from discursive psychology (Potter, 1996). A description can be regarded as *offensive rhetoric* when it undermines alternative (often competing or conflicting) accounts (Potter, 1996, p. 107f). In the analysis, attention was paid to the marketing of food products that have unhealthy connotations. The descriptions in the commercials were analysed rhetorically with a focus on how they were built up to appear factual and credible in the health discourse types and by using different rhetorical techniques.

RESULTS AND DISCUSSION

Factors influencing adolescents' fish consumption in school

The explorative study carried out means of focus group discussions elicited salient *beliefs* related to the target behaviour (eating fish in school). These beliefs were used to design a questionnaire according to the Theory of Planned Behaviour, which was applied in a cross-sectional study to determine the most important factors. The results from the study informed the development of two school-based interventions.

Explorative study (Paper I)

Sensory qualities

According to the focus group discussions taste seemed to be the most influential factor in their attitude towards fish at school lunch. This is in line with other studies of children and adolescents using focus groups (James, Rienzo, & Frazee, 1996; Neumark-Sztainer, et al., 1999; Wesslén, Hägg, & Abrahamsson, 1996) as well as other methods (e.g. Berg, 2003; Gummeson, et al., 1996; Woodward, et al., 1996). The majority of the participants in the focus groups claimed that the fish in school did not taste very good and that the fish served at home or at a restaurant tasted much better. The texture and appearance of the fish was often commented on, e.g. that the cooked fish sometimes fell to pieces. They also believed that when the fish was grey, it had been carelessly prepared. The accompaniments (i.e. the potatoes and the sauce) were important. In the focus group discussions, the adolescents claimed that sometimes they only liked the sauce and not the actual fish that was served. Often they did not like the potatoes either, and without potatoes, some pupils maintained that they would not eat the fish either.

Health aspects

Few pupils seemed to think about health when eating fish in the school canteen. Although they knew that fish could be replaced by meat or eggs and recited

almost mechanically that fish contains protein, which builds up the body and replaces tissues, pupils did not seem to relate their knowledge about health and nutrition to food and eating. Instead, some pupils claimed that teaching about nutrition often resulted in them buying vitamin pills. This phenomenon is not new. Nordin (1992), for instance, has shown that schoolchildren tend to regard food and nutrition as two different entities. When teaching about food and nutrition it is therefore highly recommended to take food and meals as the point of departure and then move on to more abstract concepts such as nutrients (Palojoki, 1997).

The context and the concept of care

The schoolchildren were not satisfied with the way the fish meals at school were prepared compared to those served at home and believed that the fish in school was prepared without taking any care. The boys in particulars made comparisons with their mother's cooking. The pupils' reference to the way the fish was prepared at home could be one of the keys to their perception of the school lunch. It is not unusual that pupils make comparisons with home-made food with the claim that the same dish at home tastes much better (Baranowski, et al., 1993). Previous studies have shown that the school food service offers a context in which the food is least accepted (Meiselman, Johnson, Reeve, & Crouch, 2000) and that the attitude towards eating various food items in the school canteen is more negative than eating at home or in a restaurant (Cardello, Bell, & Kramer, 1996). It has been pointed out that institutions are somewhere between the commercialised public sphere of eating out and home cooking and that they also, to a certain extent, should stand in for the domestic sphere (Mennel, Murcott, & Otterloo, 1992, p. 112). The actual school food service environment and the difficulty in influencing which dishes are going to be served are important features that may have a negative impact on the schoolchildren's perception of the served fish dishes. In addition to feeling that the food is not prepared with the same care in school, they may be able to influence what dishes are served to a larger extent at home.

Opportunities to influence

The pupils' sense of lack of control was obvious. In spite of the fact that a pupil-based food council had been formed at that particular school, the majority of the pupils interviewed felt that they did not have any influence. They had only a small number of fish dishes (accompaniments and side-dishes included) to choose from when planning the menu. Furthermore, they asked for more variation in types of fish (e.g. more mackerel, tuna, herring and salmon). Being

served only one dish had a negative impact on their sense of control and they claimed that sometimes only the name was changed, not the content.

The importance of friends

To some extent the pupils in the focus groups were influenced by what their friends did or said. For example, it was considered a bit odd to go to the school canteen alone. Also, the pupils were influenced by their friends if they discussed the food in negative terms. Once in the school canteen, however, they ate the fish if they liked it, even if their friends did not eat any. The opinions of parents were not particularly important. The fact that the present study deals with eating away from home leads one to expect less parental influence. What the school teachers said or did was not mentioned as having an important influence.

Cross-sectional study (Paper II)

According to the dietary assessment, 53% were categorised as fish eaters, while the rest (47%) belonged to resisters (35% only tasted and 12% did not eat the fish). Fish consumption (behaviour) was, in accordance with the Theory of Planned Behaviour, predicted by the pupils' intention to eat the fish served and perceived control. This is illustrated in Figure 3. Moreover, the pupils' intention to eat the fish could be explained by their attitude, descriptive norm (i.e. if their friends also ate the fish in the school canteen) and perceived control. Attitude was the strongest predictor of intention. Subjective norm (the opinion of people who were important to the pupils, e.g. parents) did not contribute significantly to the model.

Attitudes and beliefs

A large proportion of the pupils (73%) claimed that they had a positive attitude towards fish in general. However, the proportion of pupils who were positive towards fish in school was lower, only 55%. This negative attitude also seemed to be reflected in consumption: among those eating fish at least twice a week at home, more than one third were categorised as resisters (i.e. did not eat the fish in school or only tasted). The attitude of those 118 pupils who were positive towards fish in general were analysed further with beliefs about health, taste, care, texture and appearance as independent variables. The attitude towards fish in school was significantly predicted by beliefs about whether the fish served was healthy and tasty, and whether it was prepared with care.

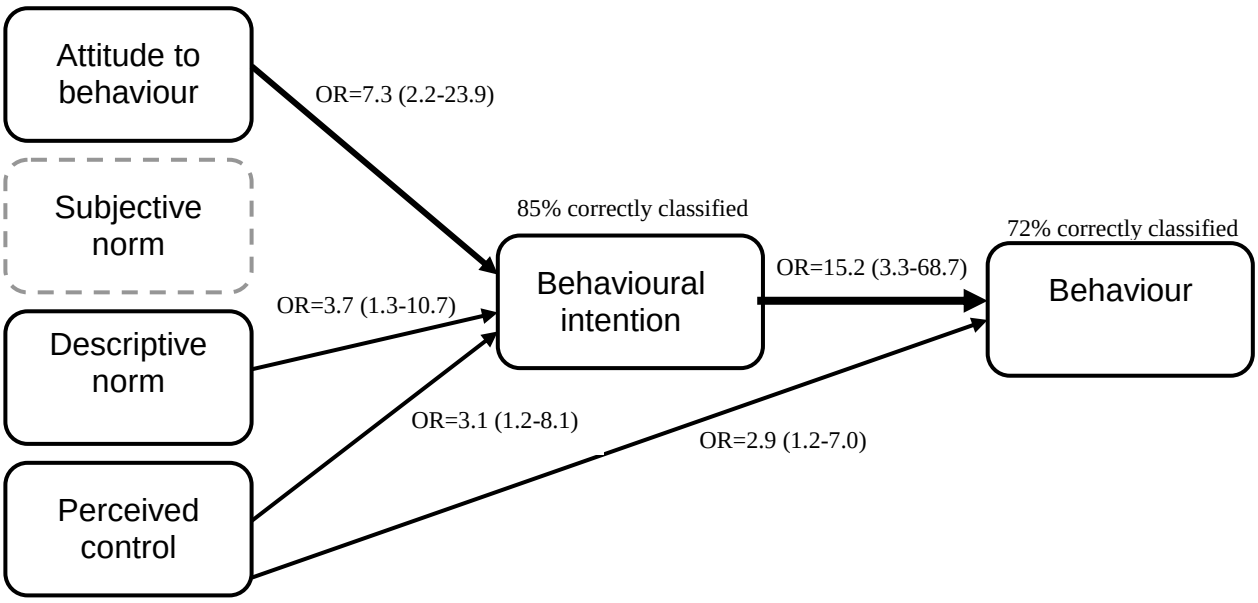

Figure 3. Results of logistic regression analysis predicting behaviour and intention to eat fish in school for resisters (non-eaters or tasters) versus eaters. Final model with odds ratio (OR and 95% confidence interval in parentheses) for significant variables and per cent correctly classified by the model.

Eaters of fish thought to a greater extent that the fish tasted good than did resisters and associated health with the fish served to a greater extent than resisters. Moreover, the texture and appearance of the fish served in the school canteen were more appreciated by those schoolchildren who usually ate the fish. Resisters were less satisfied with the taste of the sauce. A similar association was not observed for perceptions of the taste of the potatoes served with the fish, but in general the pupils were displeased with the potatoes.

Further analysis of beliefs predicting the attitude among those positive towards fish in general, supported the idea that health might be an important component of the attitude. In other words, if the pupils thought that the fish was healthy (together with being tasty and prepared with care), they were more likely to have a positive attitude towards the fish served.

The concept of care in the school canteen context was introduced in the focus group analysis. Indeed, in the descriptive study, eaters of fish thought to a greater extent that the fish was prepared with care. Thus, the role of the school food service personnel seems to be important to the pupils.

Control beliefs

The analyses of control beliefs showed significant differences between resisters and eaters regarding factors facilitating and inhibiting consumption. Resisters were more likely to think that the smell in the school lunchroom was bad and they also seemed to think that the fish would contain bones to a larger extent and that the taste of the sauce was bad. A large proportion of the pupils, 55%, did not think that it was possible for them to influence which fish meals should be served. In school lunch guidelines, it is recommended that pupils should have two kinds of dishes to choose from in order to increase consumption (Livsmedelsverket, 2007a).

Social factors

Social factors were associated with the intention of eating fish in school. Consistent with other studies of adolescents' food choice based on TPB (Berg, et al., 2000; Dennison & Shepherd, 1995), friends' behaviour (descriptive norm) contributed to predicting the intention. On the other hand, children's perceptions of opinions of people who are important to them did not add significantly to the model. Hence, the results suggest that the behaviour of friends has an impact on the pupils' consumption of fish in school. However, since usually only one dish is served within the school meal context, which was the case in the present study, one might expect a similarity between the consumption of friends.

The effect of the interventions (Paper III)

The present study examined the effectiveness of two interventions involving the school lunch and home economics classes in influencing 8th grade pupils' fish consumption in school. Since the hypothesis was that home economics instruction would enhance the effect of changes in the school canteen, the main intervention (SL+HE) was based on modifications of the home economics syllabus together with modifications of the school lunch. The effects of the interventions were measured by means of a dietary assessment and a questionnaire that included Stages of Change, attitude and nutritional knowledge items.

Changes in behaviour

Significantly more fish eaters were present at follow-up in the SL+HE group. This is shown in Table 5 as a systematic difference between baseline and follow-up regarding the behaviour of pupils in the SL+HE group. Pupils in the SL+HE group were more inclined to taste and/or eat the fish after the intervention compared to before (i.e. the 95% confidence interval, CI, did not overlap zero). This behavioural change differed significantly from the control group (i.e. the CI of the SL+HE group did not overlap the CI of the control group). School lunch changes only (SL) did not result in any significant behavioural changes, but a similar tendency was present and SL+HE was not significantly better than SL.

Table 5. Systematic disagreement in position (Relative Position; RP) for behaviour, Stages of Change and attitudes at baseline and follow-up for the control and intervention groups (95% confidence interval). Significant differences between baseline and follow-up are shown in bold.

Outcome	Control n=83[c]	SL[a] n=58[c]	SL+HE[b] n=87[c]
Behaviour (fish consumption)	-0.08 (-0.17 – 0.01)	0.10 (-0.02 – 0.22)	**0.15 (0.06 – 0.24)**
Stages of Change	-0.01 (-0.12 – 0.11)	0.12[f] (0 – 0.25)	**0.17 (0.07 – 0.26)**
Attitude towards fish in general[d]	0.06 (-0.04 – 0.17)	0.10 (-0.05 – 0.24)	**0.11 (0.01 – 0.22)**
Attitude towards fish in general[e]	0.03 (-0.08 – 0.13)	0.13 (-0.01 – 0.27)	0.08 (-0.02 – 0.18)
Attitude towards fish in school[d]	-0.01 (-0.14 – 0.12)	0.10[f] (0 – 0.21)	-0.01 (-0.14 – 0.12)
Attitude towards fish in school[e]	-0.01 (-0.15 – 0.13)	**0.19 (0.09 – 0.29)**	-0.01 (-0.12 – 0.10)

[a]SL consists of modifications of the school lunch.
[b]SL+HE consists of modifications of the school lunch together with modifications of the home economics syllabus.
[c]Numbers might be somewhat lower due to missing values.
[d]Response scale "Not at all important - Very important"
[e]Response scale "Very bad - Very good"
[f]Borderline case, not considered significant

The observed behavioural changes from baseline to follow-up in the control and intervention groups are illustrated by ROC curves (Figure 4). The co-ordinates of the curves indicate the cumulative percentages of non-eaters, tasters and eaters for baseline and follow-up in the three groups. For the intervention groups the ROC curves are located to the lower side of the diagonal of total agreement, indicating that the number of non-eaters and tasters decreased from baseline to follow-up. In SL+HE, the proportion of eaters at baseline increased from 56% to 71% at follow-up. In SL, there was an increase from 59% to 69% and in the control group there was a decrease from 77% to 69%.

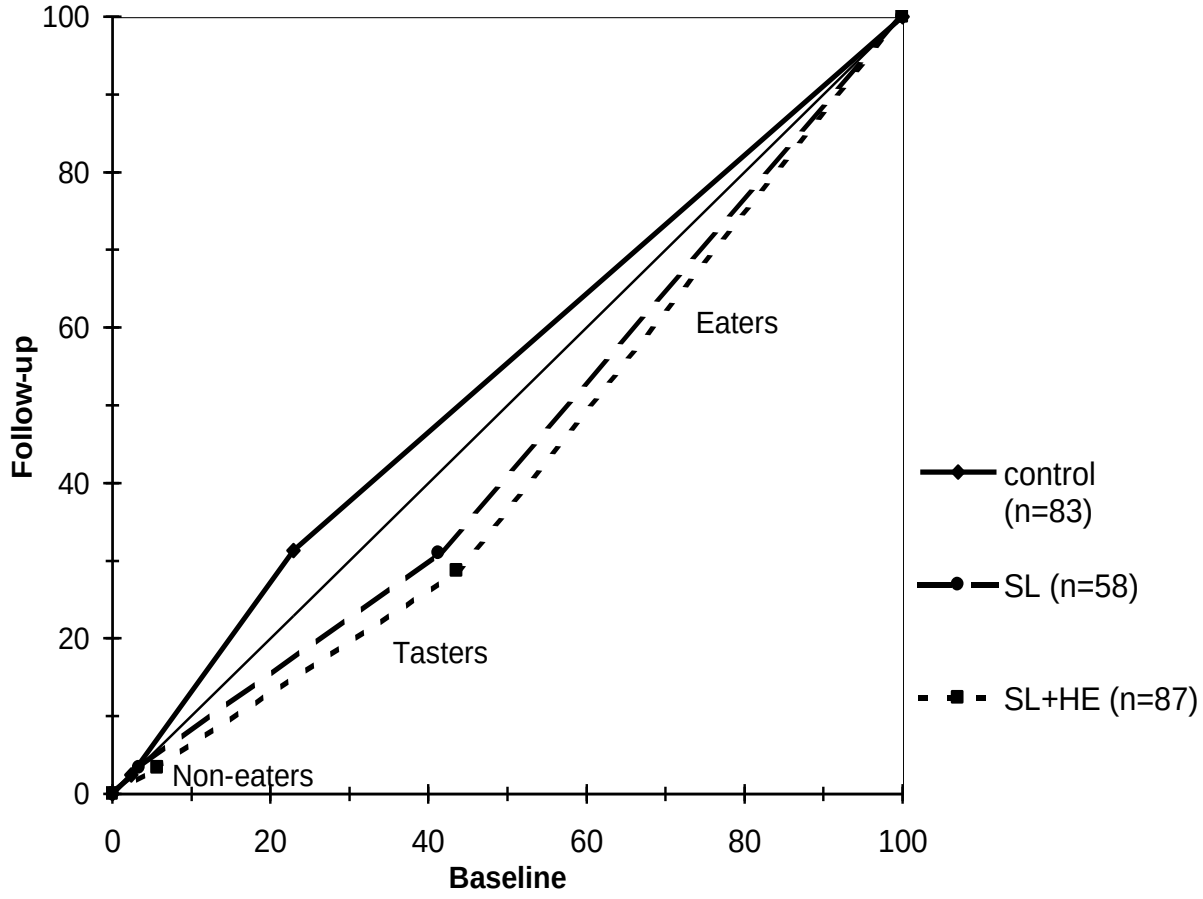

Figure 4. ROC curves for agreement regarding cumulative frequencies of categories of behaviour (fish consumption) at baseline and follow-up for control, school lunch intervention (SL) and school lunch + home economics intervention (SL+HE).

Stages of Change

The relation between Stages of Change and dietary behaviour was examined (Prell, Berg, Jonsson, & Jonsson, 2000). Both methods make it possible to classify the pupils in three categories: non-eaters (precontemplation and contemplation), tasters (preparation stage) and eaters (action and maintenance stage). The percentage agreement between Stages of Change and fish consumption was 55%; Spearman rank correlation was 0.39 ($p<0.001$). The discrepancy between actual behaviour and Stages of Change might be explained by the stage measurement itself. One of the criticisms is the use of time-dependent methods to classify people at different stages (Povey, Conner, Sparks, James, & Shepherd, 1999). The cut-off point of six months, which is often used to distinguish between the action and maintenance stage, is considered to be a bit arbitrary. Indeed, the use of six months in our case was problematic since the intervention barely lasted for six months.

However, a systematic disagreement in position towards a higher stage at follow-up was noticed for Stages of Change in the SL+HE group, which, however, did not differ significantly from the control group (Table 5). Although the Stages of Change result was not as statistically robust as behaviour, the same tendency was present. For example, 27% of the pupils in the SL+HE group at baseline claimed to be at the maintenance stage, while this was true for 45% of the pupils at follow-up.

In contrast to original study plans, providing home economics teachers with pupils' self-reported Stages of Change at baseline did not enable them to reorganise the groups in the classroom. This was probably due to the fact that pupils already work together in certain constellations, which proved hard to break up.

Attitudes

According to the Theory of Planned Behaviour, a fundamental part of the intention to engage in a specific behaviour is attitude (together with social norms and control factors). However, according to the RP values in Table 5, the pupils' attitudes towards fish in general were not subject to any larger changes except in the SL+HE group, for which one of the attitude items (with the response scale

Not at all important-Very important) had changed to more positive at follow-up. This systematic disagreement in position did not differ significantly from the control group. For pupils' attitudes towards fish in the school canteen, systematic changes were present in the SL group for one attitude item. The change in the SL group did not, however, differ from the control group. It is difficult to explain why attitudes were more positive in the group with school canteen changes only. Conditions were the same for pupils in the SL+HE group, for which reason changes would be expected in that group too.

Nutritional knowledge

Significant increases in pupils' nutritional knowledge about fish (compared to control) were detected in both the SL and SL+HE groups (Table 6).

Table 6. Percent correct responses on each knowledge item at baseline and follow-up in control and intervention groups. Differences between baseline and follow-up were tested by McNemar Test and Wilcoxon Signed Ranks Test.

Item	Control n=83[c]		SL[a] n=58[c]		SL+HE[b] n=87[c]	
	Base-line	Follow-up	Base-line	Follow-up	Base-line	Follow-up
The fat in fish is good for the heart	36	44	30	48*	48	69**
Fish is rich in dietary fibre	1	4	5	7	2	7
Sea fish is a good source of iodine	41	36	25	32	40	48
Fatty fish contains more unsaturated fat than meat	23	35	28	42	38	52
Fatty fish is for example salmon and mackerel	28	43	34	58*	47	64**
Fish is an important source of selenium	35	32	30	33	38	36
Fish contains healthy fat	67	60	53	68*	72	77
Fatty fish is a good source of vitamin D	29	32	35	37	34	45*
Vitamin D helps to build up the skeleton	48	1	44	57	58	55
Saturated fat is healthier than unsaturated fat	11	10	4	25**	4	27** *
Total number of correct responses (Mean)	3.2	3.4	2.8	4.1***	3.8	4.8***

[a]School lunch modifications.
[b]School lunch and home economics modifications.
[c]Numbers might be somewhat lower due to missing values.
*p<0.05
**p<0.01
***p<0.001

Nutritional knowledge was expected to be affected in all three study groups since all pupils had been enrolled in home economics during the intervention period. However, changes were expected to be greater in the SL+HE group than in the other two groups, but this was not the case. It is possible that an overall heightened awareness of fish in the SL group may have facilitated the acquisition of nutritional knowledge even though the syllabus was not enhanced in this group. Moreover, the same home economics teachers were engaged in home economics instruction at each intervention school. Thus, pupils in the SL group may have been subject to a "spill-over" effect if teachers became more enthusiastic as the intervention proceeded and transmitted this to all the pupils. However, the use of two schools, in which half of the pupils were involved in home economics classes, is considered to be a strength in this study. In this way, conditions in the school canteen were the same for half the pupils in each intervention group and one might assume that the behavioural changes observed in the SL+HE group were not only a result of the environmental conditions in the school canteen.

Gender aspects

Significant gender differences regarding baseline behaviour existed ($p<0.01$). There were 4% non-eaters, 20% tasters and 76% eaters among the boys at baseline. For girls, the distribution was 4% non-eaters, 42% tasters and 54% eaters. With significantly more fish eaters among the boys at baseline, their readiness to change was lower compared to the girls.

No significant gender differences could be detected regarding behavioural changes in the three groups (data not shown). A visual inspection of the RP values suggested, however, that boys (RP=0.17; 95%CI -0.35, 0.69) might have benefited somewhat more than girls (RP=0.12; 95%CI -0.03, 0.27) from the changes in the home economics syllabus (data not shown). For boys, a greater difference between SL and SL+HE was present compared to girls, on whom SL+HE gave no apparent effect over SL alone. Lack of significant gender differences may reflect the fact that there were too few participants, thus leading to wider confidence intervals. There were no significant gender differences in nutritional knowledge at baseline and no significant gender differences were observed in changes in nutritional knowledge (data not shown). Thus, it is interesting that the modified home economics syllabus might have shifted the boys' consumption patterns, without changing their nutritional knowledge.

Television food advertising to children internationally (Paper IV)

This section will be published at the same time as Paper IV in the autumn 2010.

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Health discourse in commercials to children in Sweden (Paper V)

Discourse types

Three distinctive and qualitatively different health discourse types in which food was articulated were discerned and outlined; a medical, a hedonic and a social discourse type. Each discourse type is organized around one or two nodal points (key elements) of partly fixed meanings. The medical discourse type is organized around the nodal points *protection* and *treatment*, the hedonic discourse type around *feeling good* and the social discourse type around *caring*. The health-related themes *lifestyle* and *Nature/the natural* and the *heart* symbol work as floating signifiers and are as such open to interpretation more than other elements in the health discourse, i.e. they are articulated differently in relation to the outlined health discourse types. The discourse types work together side by side so that in several commercials more than one is activated. In Figure 6, an overview of discourse types, nodal points and floating signifiers is given.

The medical discourse type

The medical discourse type focuses on the body in a medical sense and a notion of food as medicine is offered emphasized by explicit health claims. Food is articulated by the nodal points *protection* and *treatment*. Food is depicted as a powerful way of protecting the body (or certain body parts like the stomach, heart and teeth) and as treatment of risk factors or different states of ill-health. The protective or treating ability of specific nutrients (e.g. unsaturated fat, omega 3 and 6 and fibre) is emphasized. The foods promoted in a medical discourse type were mainly represented by margarine spread, low-fat probiotic yoghurt drinks, high-fibre cereals and low-fat ready-to-eat frozen meals. Health symbols such as the green keyhole[8] and the plate model[9] are commonly shown. Also, food-based dietary guidelines (Livsmedelsverket, 2007c), such as the recommended daily intake of fruits and vegetables, are referred to. Moreover, claims about the content of specific nutrients such as fat are made. The heart

[8] The green keyhole is a symbol for healthy foods in Sweden that indicates high fibre and low fat, sugar and salt content (Livsmedelsverket, 2007b)

[9] The plate model illustrates the appropriate proportions between various types of foods in a meal (Livsmedelsverket, 2007d).

symbol is present in different shapes and suggests protection of the physical heart. Also, the food was associated with being healthier because of the use of natural ingredients. A commonly depicted eating situation was breakfast, which could be considered part of a recommended healthy lifestyle pattern in Sweden (Livsmedelsverket, 2005). Lifestyle and the related healthy food choices are stressed and associations with a slim body shape are also made. The food is ordered, almost prescribed, and a certain procedure is recommended. Protective attributes are shown and a military metaphor is used.

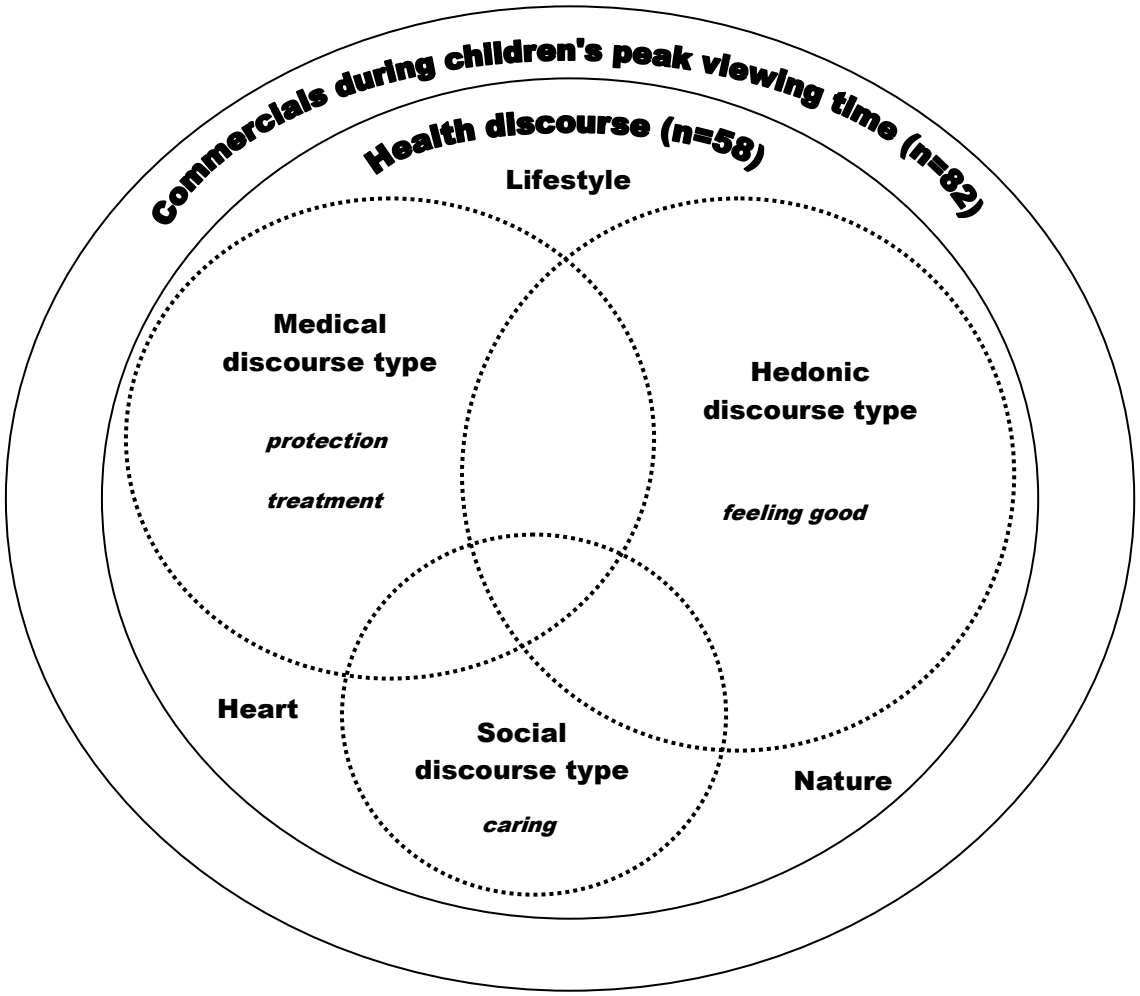

Figure 6. The health discourse in television food advertising during children's peak viewing times with health discourse types, nodal points (in italics) and floating signifiers.

The hedonic discourse type

In a hedonic discourse type, the food is described as having certain attractive sensory properties such as a nice taste, and that consuming the food in question

will make you feel good. Food is articulated by the salient nodal point *feeling good*. Food becomes a way of regulating feelings by emotional eating; i.e. enhancing mood or soothing stressed nerves (cf. Gibson, 2006). In the present study, this emotional dimension is connected to feelings of pleasure, happiness, excitement and relaxation. The hedonic discourse type appears mainly with chocolate but it was also seen with fast food and sugary drinks. Different eating situations are presented and the emotion is often exhibited after consuming the actual food. In addition, associations are made to an active lifestyle and sports (e.g. walking, skiing and football) and connecting foods to identity.

The social discourse type

The social discourse type typically deals with the importance of food in connection with social relations such as family and friends. Food is articulated by the nodal point *caring*. Women, men, children, families or friends are depicted eating or preparing food together or thinking about their closest relations by offering food. The caring dimension in connection with food is associated with showing love by the food you prepare. It is generally a woman who shows caring by, for example, pouring milk for her family at breakfast, bringing food to her husband working in the fields or offering pastilles to a male friend. The 'food as a gift' metaphor (cf. Lupton, 1996, p. 109) is activated to express love and care. A social discourse type is present together with many types of foods such as ecological milk products, bread, ham, cheese spread, cereals and sausages, but also soft drinks, crisps, chocolate and candy. Tradition, nature and basic instincts are particularly important and a natural lifestyle is promoted. What has been produced for generations cannot be bad and Nature cannot be wrong; you should trust your basic instincts when considering what is best for your family.

Floating signifiers

Nature, lifestyle and the heart are recurring health-related themes and symbols that work as floating signifiers in relation to the outlined discourse types and as such they are open to different ascriptions of meaning more than other elements in the discourse. In the present study, floating signifiers are treated as an indication of different orientations towards health. For example, the heart is used to signify both physical health in a medical-oriented health discourse type and to express love in a social-oriented health discourse type.

A healthy lifestyle, articulated in a medical discourse type, is associated with the right way of living to establish a new healthy habit in order to protect physical health and constructed as a personal responsibility: "Now it is <u>your</u> turn" to keep

fit. However, lifestyle is also conceptualized in terms of way of living in order to express identity in a broader sense in a hedonic discourse type. Lifestyle is not constructed as responsibility but as one of many possibilities for 'feeling good' by using available articulations of various lifestyles to form an identity.
Nature and 'the natural' are articulated as especially healthy in connection with a medical discourse type. What nature produces cannot be bad for the body. However, Nature is also conceptualised in relation to a social discourse type in which 'caring' is articulated as a basic natural instinct and a notion of women as part of Nature is communicated for instance by using a pregnant woman in one of the commercials. Pregnancy is associated with thinking about the health of your child as well as your own health so the message could be interpreted as meaning that if you care about your child you should give her/him the promoted product.

Offensive rhetoric

In the analysis, it was obvious how foods with unhealthy associations were articulated in the health discourse types and promoted with offensive rhetoric. A description could be regarded as *offensive rhetoric* when it undermines alternative (often competing or conflicting) accounts (Potter, 1996, p. 107f). In previous research, offensive rhetoric has been used to counteract conflicting and competing accounts associated with health. In a study on tobacco use and smoking in Swedish advertising (Torell, 2002), words and images were placed in a health discourse and associations with risk, discomfort and unhealthiness were avoided and instead inverted so that smoking and cigarettes were presented as especially healthful activities. In the present study, offensive rhetoric was used, for example, to articulate fast food hamburger meals as part of a healthy lifestyle and crisps and butter spread as naturally healthy. Moreover, it was used to show that healthy food can taste great and that it is possible to enjoy food without feeling guilty.

Common rhetorical techniques were quantification, empirical evidence and scientific arguments and they were mainly used in connection with a medical discourse type.

Fast food hamburger meals is part of a healthy lifestyle

Two hamburger fast food meals are promoted by means of lifestyle connotations activated within a medical discourse type. The notion that fast food hamburger meals cause overweight is inverted by instead presenting them as treatment for

being in bad shape and as a means of dieting. Moreover, aspects in a medical discourse type are used to counter unhealthy connotations in children's hamburger meals and any bad conscience that parents may have when they offer such meals to their children. The commercial dismisses the notion that children do not like healthy foods and that caring is only about offering what children like. Lifestyle connotations, the low glycaemic index diet and the plate model are used as rhetorical strategies.

Crisps prevent inactivity, are natural and healthy

The notion that crisps are unhealthy and contributes to an unhealthy lifestyle is rejected and a medical discourse type is activated when promoting that the promoted crisps consist of a natural and healthy composition. The crisps are connected to physical activity, heredity and basic instincts, the heart and natural ingredients, emphasized by quantification and maximization.

Milk fat is naturally healthy

Trust in Nature and what nature provides is communicated in a commercial for a butter spread to counter the fact that saturated fatty acids are unhealthy[10]. A message is constructed that we should trust in a cow's basic instinct; to graze and produce natural, healthy milk, and that what Nature provides will be healthy for the body.

Healthy food can taste great and delicious food can be enjoyed without feeling guilt

A sugary cereal is promoted as a healthy choice by means of medical lifestyle connotations and within a hedonic discourse type. In this commercial, the notion that healthy food does not taste good is countered. Furthermore, the popular assumption that it is sinful to enjoy food, and that this pleasure might give you a bad conscience, is dismissed. The sugary cereal is constructed as a temptation that it is permitted to enjoy because it is healthy. The commercial focuses on making lifestyle changes taking hedonic aspects into account. By using a contrasting technique (Potter, 1996) the 'right choice' is pointed out and certain foods are classified as bad. The sweet cereal is contrasted with chocolate cake to make it seem healthier (and more appealing). The focus is on a slim body shape and a low fat content in a red circle counters the high sugar content.

[10] According to Swedish nutrition recommendations (Livsmedelsverket, 2005), saturated fat should be limited in the diet.

Feeling good, when enjoying this cereal, is articulated as having "a clear conscience".

GENERAL DISCUSSION

In the present thesis, influences on dietary change among children and adolescents on different levels have been dealt with. The social psychological model the Theory of Planned Behaviour was used to guide the content and dissemination of a dietary intervention and the physical school setting provided an important arena for dietary change. The focus was on individual factors such as attitudes, beliefs, social norms and perceived control. Macro-level influences such as television food advertising were also acknowledged and examined both at a global and a local level, where health messages were analysed critically. Some strengths and limitations of the current studies will be further attended to before television food advertising and health promotion in school is discussed.

Strengths and limitations

Focus group discussions (Paper I)

Trustworthiness in the focus group discussions can be questioned if the participants do not say what they think due to group pressure for example, or if they exaggerate in order to convince the other participants to accept their own views (Wibeck, 2000). The atmosphere in the three groups differed considerably. The girls were better at expressing their own views than the boys; they used longer sentences and seemed more absorbed by the topic. Because the boys were much quieter and did not seem to be so interested in the subject, the moderator had to ask more questions, and group interaction was almost lost. Moreover, the boys appeared to be checking each other more than the girls. The mixed group was the liveliest one, particularly during discussions between girls and boys, which might explain the fact that more ideas and thoughts came up in this group. This type of gender differences in the way young people express themselves in focus groups has been described in other studies (Pötsönen & Kontula, 1999; Wesslén, Hägg, & Abrahamsson, 1996). According to Wesslén (2000), girls listen more carefully to each other, while the boys are hierarchical and more subject to group control. One of the advantages of using existing groups (i.e. the class) as we did was that we accessed a genuine social context.

Adolescents' everyday views about the school lunch were discussed and they seemed to appreciate having someone listening to what they appeared to have discussed many times before.

The dietary assessment method (Papers II and III)

The dietary assessment method was developed in the pilot study and consisted of structured observations of pupils' intake and plate waste in the school canteen setting. The method was fairly easy to administer as well as being feasible in a school lunch context. Moreover, inter observer agreement was tested and the 80% agreement between the two observers was highly satisfactory. Measuring intake objectively was considered a great strength since studies usually rely on pupils' self-reported behaviour, which may be subject to reporting errors including social desirability bias. Another benefit of using observation as a method is that the method is not dependent on people's memory and is relatively independent of people's willingness to give information.

Although it may seem obvious that direct observation is the most accurate way of assessing true food intake, even this method has limitations. For instance, stringent attendance requirements for inclusion in the analysis may have resulted in the exclusion of more observations than necessary. It is possible that the result would have been different if we had included data from pupils attending the school canteen only once before and after intervention. Moreover, this method was not designed to measure exact fish intake but to give a rough estimate of pupils' intake. The weighing method is of course much more exact but would have been quite difficult in a school meal situation with pupils waiting for their food, and weighing the food would probably have influenced the behaviour more. Only one hot dish at a time was served for lunch in the schools where the study was carried out. Measuring fish consumption only four or five times during the intervention period on each measurement occasion may be insufficient since the whole range of fish dishes usually served at the schools did not appear on those occasions. Nevertheless, both fried and cooked fish as well as fish au gratin were represented on at least one occasion and the goal was not to differentiate between consumption of the various fish dishes.

The school-based intervention (Paper III)

A possible reason for the success of the intervention described here could be that it addressed a highly specific behaviour, set behaviour change as a goal and

used behavioural theory and prior research when developing the interventions (Contento, et al., 1995; Contento, et al., 1992; Lytle & Achterberg, 1995). The design of interventions was guided by the TPB (Ajzen, 1991) and prior research on the target group, which resulted in well-founded components and actions in the interventions. Prior research has shown that the TPB is suitable for understanding factors influencing food choice in both children and adolescents (Berg, et al., 2000; Dennison & Shepherd, 1995; Gummeson, et al., 1997) and that it can be useful for suggesting the content of interventions (Bartholomew, Parcel, Kok, & Gottlieb, 2001; Contento, et al., 1995). The steps recommended by Conner and Armitage (2002, p. 92), to first determine which TPB variables are most predictive of intention and behaviour and then identify the salient beliefs that would be most effective to aim at changing were followed. The home economics syllabus has also been used successfully by others (e.g. Klepp, 1992) to influence behaviour. Moreover, in line with conclusions in a review of nutrition education intervention research (Contento, Randell, & Basch, 2002), much effort was put into developing appropriate evaluation instruments and assessing reliability in the pilot studies.

The schools in the intervention study were matched and had to meet certain criteria to be included (e.g. socioeconomic similarity, the same number of pupils etc.), which means that the population could be considered to be non-biased. Moreover, the schools were randomly assigned to either a control or intervention group. However, a number of other features were not optimal and limited the conclusions that could be drawn. For instance, baseline differences between groups might have influenced the results. Specifically, more pupils in the control group were fish eaters, which means that the potential for change were somewhat lower in that group. Also, since there were significantly more fish eaters among the boys, their readiness to change was lower compared to the girls. The dropout rates in the intervention and control groups have also been noted above. However, it was not the aim of the present study to get pupils who were not interested in having school lunch to come to the school canteen, but to try to influence those who already went there regularly. Moreover, the percentage of pupils attending the school lunch was 58%, which was similar to other studies (Höglund, Samuelsson, & Mark, 1998). It is most likely that other measures, apart from those that were applied in this study, will have to be taken in order to convince resisting pupils to come to the school canteen.

One limitation of the intervention study was that we did not use a factorial design, i.e. there was no group assigned solely to a home economics intervention (HE). It would have been desirable to examine the impact of home economics alone on eating behaviour as has been recognised by others (Contento, et al., 1992), but because of time limits and financial constraints this was not feasible. Future intervention studies could employ a design that makes it possible to assess single effects as well as combined effects. Finally, the duration of the intervention was relatively short. Although fish intake in the school canteen was influenced during this time, we do not know whether the effects were lasting. It has been recommended that future research should concentrate on how the effects of an intervention can be maintained, in addition to studying outcomes immediately after the intervention.

Television food advertising (Paper IV)

The present study was designed to be able to present a picture of food advertising to children internationally. A standardized protocol was used, with methods that were fairly simple and easy to carry out and allowed for direct comparison between countries. The overall inter-coding reliability between and within research teams regarding food versus non-food and food coding categories, was deemed highly satisfactory.

In contrast to previous international research comparing television food advertising across countries, the present study analysed television recordings of considerably longer duration: 192 hours per country compared to between 20 (Dibb, 1996) and 40 hours (Consumers International, 1999) in previous studies, and is consequently more robust in terms of representativeness and statistical power. To our knowledge, this is also longer than what previously has been recorded in Sweden.

Moreover, only programs designated for children and broadcast on weekday afternoons and weekend day mornings were analysed according to a previous study (Dibb, 1996). While children obviously watch television outside children's programs, the current study analysed recordings from children's peak viewing times (where this data was available). In Sweden, data from MMS Mediamätning i Skandinavien (MMS, 2009), ensured that representative data on children's viewing patterns the previous year for TV3, TV4 and Kanal 5 were obtained. However, it might also be a limitation that we trust a company to provide accurate data on these viewing patterns.

Furthermore, recordings from each country were carried out on typical broadcasting periods (excluding national holidays, large sports competitions, special events and low rating holiday periods) over a period of six months (October 2007 – March 2008). In Sweden, the recordings were carried out during one week in late November to ensure a typical broadcasting period. However, the approaching Christmas or other seasonal variations might have increased the total number of advertisements. A previous study of television food advertising to children in Sweden demonstrated a higher proportion of advertisements recorded in November compared to March but that could also be due to recording errors as some data were missing (Sveriges Konsumenter, 2007, 2008).

Not all aspects of television food advertising to children were analysed, for example, duration of advertisements. However, according to Australian research (McGinnis, Gootman, & Kraak, 2005), advertising frequency and duration are related; increased frequency leads to increased duration. What is more, channel promotions (advertisements for other programs) were included in the total sample. Had they been excluded, a higher proportion of food advertising in the overall advertising would have been detected.

The food classification scheme was developed in collaboration with the participating research groups. However, it did not allow for local, culturally sensitive adaptations. Margarine spread, for instance, was not considered to be a core food, although, by Swedish standards, one might argue that margarine spread with a healthy composition of fatty acids is an important part of a healthy, well balanced, diet.

Discourse analysis (Paper V)

The present study critically analysed the health discourse in television food advertising. By focusing on discerning discourse types in the health discourse it was possible to outline differences and potential meanings more closely. However, the different health discourse types that were discerned and presented in the analysis are in fact *analytical distinctions* that were made. Indeed, Winther Jørgensen & Phillips (2002, p. 143), suggest that we treat discourse as an analytical concept "that the researcher projects onto the reality in order to create a framework for study". The question of delimiting discourses is considered to be both a practical and a theoretical problem, which should be guided by the

research aims. By concentrating on *food* articulations in the health discourse, different understandings of food became obvious, which eventually guided the formulation of discourse types. In practice, the outlined discourse types work together in the commercials and were activated in different ways. For example, part of what has been categorized as a hedonic discourse type, organized around 'feeling good', might also have been viewed as *treatment* of psychological problems in a medical discourse type.

Moreover, in the analysing process a number of salient concepts were identified and tested as nodal points, i.e. key elements around which the discourse is organized. One important concept that was found to recur was taste. However, it became evident that the taste dimension was not related to health in a clear-cut way. When present in the commercials included, associations to taste were viewed as belonging to the feelings of wellbeing and pleasure (feeling good) that the marketed food products in question offered. Another concept was togetherness which was not unambiguously related to health and eventually this concept was not considered to be a nodal point but rather an aspect of the caring dimension.

The question of validity in discourse analytic research has been addressed by Winther Jørgensen & Phillips (2002, p. 173), who argue that the analysis should be *solid* (based on a range of different textual features), *comprehensive* in terms of addressing the research questions posed to the text fully and presented in a *transparent* way. The present analysis of how food was articulated in the health discourse in television food advertising included all features such as, voiceovers, written text, pictures and the plot. These features were transcribed fully by the present author and in the research group we had many discussions in this process of translation about what could be considered health aspects to be included. We also watched commercials together with examples of transcripts and discussed special cases. Another aspect that deserves attention from a discourse analytical point of view is that the transcriptions were made in Swedish and then translated into English. The initial analysis was carried out on the Swedish transcriptions and it was not until illustrative examples were picked out that they were translated into English. Finally, it was our ambition to present the analysis clearly, in a transparent way, so that it would be easy to follow, reproducing the empirical material and the interpretations that were made.

Television food advertising to children

Data on the extent and content of television food advertising to children internationally has been presented, which allows for between-country comparisons. While the rate of food advertising varied between countries, both overall and during children's peak viewing times, the majority (67%), in all the countries, involved unhealthy non-core food products. Moreover, the proportion of non-core food advertising was higher overall during children's peak viewing times compared to non-peak viewing times (72% vs 62%) and was consistently higher in all the countries but three (China, Germany and Greece). Furthermore, the use of persuasive techniques was highest for non-core food products (with the exception of China (Hong Kong) as regards premiums and China (Hong Kong) and Italy as regards promotional characters.

Given the scientific evidence regarding unhealthy food marketing and its impact on children's food choices, purchase requests and consumption (Cairns, et al., 2009), and the observed associations between the frequency of unhealthy food advertising on television and the prevalence of childhood overweight (Lobstein & Dibb, 2005), these results are certainly issues to be concerned about. Policy implications and regulatory restraints in individual countries should be discussed. These could include the type of programs in which advertisements are broadcast, the type of product, the target audience, the time of day and the content of advertisements (Handsley, Mehta, Coveney, & Nehmy, 2009).

Sweden is often mentioned as a pioneer and an example of a country that, to a great extent, does not permit advertising to children. Regulations include, for instance, the stipulation that commercial advertising in a television broadcast may not be designed to attract the attention of children less than 12 years of age and that individuals or characters who play a prominent role in programmes that are primarily aimed at children less than 12 years of age may not appear in commercial advertising in a television broadcast. However, regulations apply only to channels broadcast from Sweden and the channels TV3 and Kanal 5 examined were not included. These channels are broadcast from the UK. Interestingly, in January 2008, after the recordings of the Swedish data were made, restrictions designed to reduce the number of commercials for high-fat, sugar and/or salt (HFSS) food and drink products to children younger than 16 years were introduced in the UK (Ofcom, 2007). These restrictions apply to all

channels transmitted by UK broadcasters; both the channels aimed at UK audiences and outside the UK (e.g. the Swedish channels TV3 and Kanal 5).

While the extent of non-core food advertising in Sweden was high overall (63%) and even higher during children's peak viewing times (66%), the overall proportion of persuasive marketing techniques was comparatively low (4% premium offers and 11% promotional characters). However, it is a matter of concern that the five most advertised foods during children's peak viewing times in Sweden all belonged to the non-core food category (fast food, alcohol, confectionary, sugary drinks and high-fat spreads and sauces). It is also quite alarming that alcohol is the second largest group (14%) after fast food (15%). It may be that children are not the main target group for alcohol advertising (children's peak viewing times include time periods when adults are watching TV too); nevertheless children's daily exposure to alcoholic beverages in media might need some further attention. Without doubt, food marketing on Swedish television contributes to normalizing foods and beverages in children's lives that are not consistent with dietary guidelines.

Given the large proportion of foods high in undesirable nutrients and/or energy (non-core foods) that children are exposed to in television food advertising and the potential threat to children's health this poses, one might ask whether restrictions on the advertising of non-core foods perhaps should be included in the regulations in Sweden? Further research could assess the number of HFSS foods on TV3 and Kanal 5 to see whether the new restrictions introduced in the UK are effective and whether the rate of non-core food advertising turns out to be lower than on TV4.

The global study on food advertising to children did not allow for any extended analysis of the recorded food commercials with regard to how they were constructed and any health aspects used. Accordingly, in an analysis of the recorded Swedish food commercials, specific attention was paid to health messages in food commercials broadcast during children's peak viewing times by means of investigating how food was articulated in the health discourse. The analysis allowed for a critical examination of the use of health aspects as offensive rhetoric and it was demonstrated that non-core foods such as specific hamburger meals, crisps and butter spread were endorsed as "healthier" alternatives by means of various rhetorical techniques.

Food was articulated in a medical discourse type as treatment or protection and, as Zwier (2009) has also demonstrated, these kinds of medical associations were present for both core and non-core foods. In the present study, a hamburger meal was, for instance, marketed as treatment of overweight by means of glycaemic index associations. The use of medical aspects adds credibility to statements (Potter, 1996) and in a medical discourse type lifestyle aspects that construct lifestyle choices as a personal responsibility were used. In the present study, a hamburger meal for children was associated with a well-known pedagogical model for a balanced healthy meal: the plate model, with claims about how easy it is to choose "right". The food industry seems to adopt the role of an actor giving information about healthy choices and healthy eating to the general public. What consequences will such claims have for children's perceptions of a healthy, well-balanced meal? It is important to be watchful at these attempts of offensive rhetoric within a medical discourse when they are used in food marketing.

The designing of health promotion campaigns in the media and the use of pedagogical tools have attracted attention (e.g. Dorey & McCool, 2009) and misinterpretation might be an issue to consider here as well as the value-enhancing issues at stake. However, if the food is altered in line with what the health symbols or pedagogical tools claim, it must also be regarded positively. But at a fast food restaurant, choosing a healthier alternative might not always end up as the healthiest option. For instance, research has shown that people tend to underestimate the energy content of meals and order energy-rich side dishes at fast food restaurants that claim to be healthy (Chandon & Wansink, 2007). We believe that a critical analysis of how food is articulated within the health discourse initiate for a discussion about the content of food advertising, the methods used by the industry and the effect it might have on children's perceptions of food and health. Further studies could address how children together negotiate health and interpret health messages and health symbols in commercials dealing with unhealthy non-core foods.

Health promotion in school

The school proved to be an excellent arena for promoting and achieving dietary change. The two interventions, when combined, were successful in increasing fish consumption in school, which was the original intention. A supportive environment with opportunities for making healthy choices in the school canteen was created and in the home economics classes the schoolchildren gained access to health information and practised skills in preparing fish meals.

Environmental changes in the school canteen, taking into account the *whole* meal, including accompaniments such as potatoes and sauce was important as well as pupils having the opportunity to influence what is going to be served. Some other aspects that were useful in the interventions were, for instance, health aspects, and the concept of care. The concept of care in the school canteen was taken into account in different ways. To show care, the fish was cooked carefully to make it taste better and it was nicely decorated. Moreover, care was stressed in the SL+HE group by showing slides and talking about the work in the school canteen kitchen. Other studies have shown how important the school food service personnel is for the pupils' opinion of the school lunch (James, Rienzo, & Frazee, 1996; Meyer, 2000a). They are vital in the communication process. What does care mean to them and how could it be expressed in a school meal context? We need to examine the opinions of the staff more thoroughly in order to obtain their view of the school meal situation and further studies should investigate how it is possible to show care when cooking in school. It is also interesting that 'caring' was a nodal point in the health discourse (social discourse type) in television food advertising. Food was actually articulated as caring. Could this have implications for the marketing of the school lunch? Can marketing be achieved in a social discourse type, taking caring aspects into consideration? More attention needs to be paid to the meaning of caring in a school canteen context.

It was the intervention group with the additional changes in the home economics syllabus that actually changed fish consumption significantly. Significantly more fish eaters (who ate more than a half portion) were present in that group after the intervention period. Thus, home economics education seems to play an important role in bringing about dietary change in school children. However, it was not clear that it actually was nutritional knowledge that

mediated behavioural change since knowledge was more or less equally affected in both intervention groups (possibly due to so called spill-over effects).

The increased frequency of cooking classes that the pupils in the SL+HE group were involved in (5 classes instead of the usual 3) might be important. One lesson was dedicated to cooking a fish dish similar to the one the pupils voted for, i.e. to be served in the school canteen. Practical, hands-on experience of different foods has been found to increase dietary acceptance of the same foods when they are offered in the school canteen (Demas, 1995). In another study, actual cooking experiences and eating food with peers accompanied by classroom instruction provided a promising approach to nutrition education (Liquori, et al., 1998). It was shown in the cross-sectional study that what other people *did* (i.e. that the pupils' friends also ate the fish) was more important than other people's (e.g. parents') opinion about fish consumption in the school canteen. Pupils influence and learn from each other when eating at the school lunch and, perhaps more importantly, by cooking dishes during home economics classes similar to those offered in the school canteen. Co-operation between home economics teachers and school food service personnel should be encouraged since they both have a central role regarding food and health issues in school.

Health messages in television food advertising could be an issue that is dealt with and critically discussed in home economics classes. Since the diet that is promoted in television food advertising during children's peak viewing times is not in accordance with public health recommendations, and confusing health messages with non-core foods are present, the school could counterbalance this by offering healthy meals in accordance with nutrition recommendations and discussing the meaning of healthy eating in the classroom. Health-promoting media literacy programs, which to a large extent are conducted in classrooms, have potential to improve unhealthy behaviours (Bergsma & Carney, 2008). Home economics teachers can help children develop their critical thinking about how media may influence and shape social norms and dietary practices. Media literacy education and the development of children's critical thinking in relation to food advertising should be further investigated.

We live in a society where health is selling. Health is certainly believed to be an essential component in food marketing and it is not only medical aspects but also aspects of feeling good and caring that are communicated to the general

public. Thus, health messages are important in the promotion of dietary change in television food advertising and should continue to be on the agenda when teaching about and encouraging healthy eating habits and dietary change in school.

CONCLUSIONS

- Dietary change can be achieved by modifications of the school lunch augmented by changes in the home economics syllabus.

- The Theory of Planned Behaviour is a useful theory in the development of interventions aiming at dietary change.

- When promoting a food the eating context must be considered, e.g. with which accompaniments, where, when and with whom the food is eaten.

- The measurement of a specific dietary intake by means of direct observation is feasible in the school lunch context.

- Internationally, children are exposed to high volumes of unhealthy television food advertising, featuring child-oriented persuasive techniques.

- Likewise, children in Sweden are exposed to television food advertising with a large amount of unhealthy foods and beverages, including alcohol.

- Health aspects are used extensively in Swedish commercials during children's peak-viewing times; food is articulated as treatment or protection, as feeling good or as caring.

- Some foods with unhealthy associations (e.g. hamburger meals, crisps and high-fat dairy) are promoted as 'healthier' by means of offensive rhetoric.

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Appendix 1

Advertised products and commercials in Sweden during children's peak viewing times

Product name and description (n=64)	Number of commercials (n=82)	Length (s)	Repetition (number of times)
35 South Castillo de Molina (wine)	35 South Castillo	15	1
Actimel (probiotic yoghurt drink)	Actimel	20	3
Apotekarnes (soft drinks)	Apotekarnes 1	10	1
	Apotekarnes 2	5	1
	Apotekarnes 3	5	1
	Apotekarnes 4	5	1
Arboga Pastej (liver paste)	Arboga	30	3
Arla Ekologiskt (ecological milk products)	Arla Ecological	45	1
Arla Yoghurt (ecological yoghurt)	Arla Yoghurt	40	4
Baileys (Liqeur)	Baileys	10	6
Becel Mat (cream for cooking)	Becel Mat	10	1
Becel Pro.active (probiotic yoghurt drink)	Becel Pro.active	10	4
Becel (margarine spread)	Becel	10	3
Bregott (butter spread)	Bregott 1	20	2
	Bregott 2	20	2
	Bregott 3	20	1
Burger King Angus Burger	Burger King 1	30	4
	Burger King 2	5	2
	Burger King 3	5	2
	Burger King 4	10	2
Burn (energy drink)	Burn	30	7
Campo Viejo (wine)	Campo Viejo	15	1
Cheerios 4 grain (cereals)	Cheerios	20	1
Cloetta Kexchoklad (chocolate)	Cloetta	20	6
Coca Cola (soft drink)	Coca Cola	45	14
Coca Cola Light (soft drink)	Coca Cola Light	30	1
Falcon (beer)	Falcon 1	20	4

	Falcon 2	20	2
	Falcon 3	15	2
	Falcon 4	15	2
Fanta World (soft drink)	Fanta 1	30	4
Felix Nya Lunchupplevelse	Felix Beef Yakiniku	20	6
Felix Nya Lunchupplevelse (all meals)	Felix Meals	30	2
Findus Kökets Utvalda (Thai chicken meal)	Findus 1	30	7
	Findus 2	10	6
Fontana Candida (wine)	Fontana Candida	10	6
Grandiosa (frozen pizza)	Grandiosa	15	10
Grant’s (whisky)	Grant’s	30	1
Heineken (beer)	Heineken 1	30	5
	Heineken 2	30	5
Jacob’s Creek (wine)	Jacob’s Creek	10	8
Jokk Bärdryck (berry drink)	Jock Bärdryck	15	9
Kalles Färskost (cream cheese)	Kalles Färskost	10	7
Kavli Mjukost (soft cheese)	Kavli	30	1
Kellogs All Bran Regular (cereals)	Kellogs All Bran	35	3
Kellogs Special K Red Berries (cereals)	Kellogs Special	25	10
Knorr Vie (fruit and vegetable shot)	Knorr 1	15	2
Loka (mineral water)	Loka 1	10	6
	Loka 2	5	11
Lätta (Mini) (margarine spread)	Lätta 1	20	4
	Lätta 2	15	2
Lönneberga (smoked ham)	Lönneberga	30	4
Maltesers (chocolate)	Maltesers	20	4
Marabou Aladdin (chocolate)	Marabou Aladdin	30	10
Marabou Mjölkchoklad (chocolate)	Marabou Mjölk 1	45	8
	Marabou Mjölk 2	30	3
Marabou Noblesse (chocolate)	Marabou Noblesse	15	1
Marabou Premium (chocolate)	Marabou Premium	20	2
Marabou Premium Specialitet (chocolate)	Marabou Premium S	20	2
Max GI Burger (hamburger)	Max GI	45	7
Mc Donald’s (fast food)	Mc Donald’s	5	5
Mc Donald’s Big and Juicy (hamburger)	Mc Donald’s Big	25	14
Mc Donald’s Happy Meal (meal)	Mc Happy Meal 1	40	8
	Mc Happy Meal 2	10	3
OLW Chips (potato crisps)	Olw	45	3

Pringles Rice Infusions (rice crisps)	Pringles	20	2
Pågen (breads)	Pågen	5	7
Pågen Rasker (bread)	Pågen Rasker	30	3
Redbull (energy drink)	Redbull	30	2
Riesen (chocolate toffee)	Riesen	25	7
Santa Maria Red Fusion (tex mex spice)	Santa Maria	15	1
Sibylla (sausage)	Sibylla	20	1
Snickers (chocolate)	Snickers	30	2
Tropicana Pure Premium (fruit juice)	Tropicana	30	1
Tullamore Dew (whisky)	Tullamore Dew	15	2
Valio Laktosfritt Kök (milk product)	Valio	20	8
Verum Hälsofil (probiotic soured milk)	Verum 1	30	1
	Verum 3	10	1
Vina Maipo (wine)	Vina Maipo	10	4
Wrigley’s Extra Pastilles	Wrigley’s	25	3
Xider X-mas Limited Edition (alcocider)	Xider X-mas	15	8
Zoegas Christmas Coffee (coffee)	Zoegas	15	7