Consumer socialization via SMS – The influence of feedback intervention on healthy and pro-environmental behaviour among children and adolescents

Thesis Proposal

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Introduction – why study consumer socialization and feedback intervention?

The development of modern consumer society in mainly Western societies is characterized by rapid technological development, increased supply of goods and an increased number of choices. A so-called consumer culture has emerged. Consumption of goods flags attitudes, creates social bonds and distinctions, displays a desired lifestyle etc. (Featherstone, 2007). In order to understand individuals’ adjustment to the new consumption roles, classic socialization theory has been broadened within the last 50 years. It has been argued that the traditional secondary socialization process can be applied to all ages and life stages covering "learning that prepares the individual for membership in his society or in particular groups within the society" (Clausen, 1968, p. 139). The broadened concept of socialization includes concepts such as consumer socialization (Ward, 1974), anticipatory consumer socialization (Moschis & Moore, 1984), social learning theory (Bandura, 1977), social cognitive theory (Bandura, 2001) and decision-making among adolescents (Moschis & Moore, 1979). One of the first to investigate the concept of consumer socialization was Scott Ward; he defined consumer socialization as "processes by which young people acquire skills, knowledge, and attitudes relevant to their functioning as consumers in the marketplace" (Ward, 1974, p. 2).

This definition is the point of departure for an on-going discussion in the literature about the concept of consumer socialization (Aldous & McLeod, 1974; Ekström, 2006; Foxman, Tansuhaj, & Ekström, 1989; Moschis, 1987). Aldous and McLeod criticize Ward for "not being sufficiently demanding of research designs appropriate to his definition of socialization as a process of change over time through transaction with other people involving direct or mediated communication" (Aldous & McLeod, 1974). The time perspective and the degree of consumer socialization are very important issues when doing research in this field. Processes take time, but how much time? And who is to judge when a certain type of behaviour has become internalized in a socialization process? Already in 1968, John Clausen pinpointed the dilemma: “The question that we must eventually face is whether every demand for behavioural adjustment or change is to be labelled socialization, or, if not, where are we to draw the line” (Clausen, 1968:154). The point of departure in this thesis is that SMS feedback and its impact on family interaction contribute to the overall consumer socialization.

A review conducted by Ward shows that “it seems that consumer socialization proceeds more through subtle social learning processes, rather than through purposive and systematic parental training” (Ward, 1974:8). The first research on consumer socialization identified three major socialization agents influencing children’s consumer behaviour: parents, peers and mass media, describing parents as the main socialization agent until adolescence where peers take over (Dotson & Hyatt, 2005; Moschis & Moore, 1979; Ward, 1974). This picture seems to be more complex today with a growing number of influencers as a result of increased access to information via digital media, more shopping possibilities, available brands etc. (Dotson & Hyatt, 2005). It will be argued that feedback intervention can influence the behaviour of older children and adolescents as well as that of adults.

My point of departure in this thesis will be the broader view on consumer socialization as social learning. Social learning is not about a certain type of behaviour (e.g. purchasing), rather it is a way of adopting skills and competences that can be put into practice in different kinds of consumer behaviour – even if the knowledge achieved cannot be applied immediately (what Moschis and Moore refer to as “anticipatory socialization” (Moschis & Moore, 1984)). From a social cognitive theoretical point-of-view it will be argued that feedback intervention directed at behavioural change may contribute to the
overall consumer socialization in a specified behavioural area since feedback intervention provides a learning process in which factors of behavioural change will be influenced.

Research aims
This thesis will study consumer socialization and feedback intervention in order to understand how children and adolescents adopt certain consumption types and use the feedback to adjust their behaviour to one that is more beneficial to themselves and/or society (cf. Andreasen, 1994). Changing behaviour has a moral implication: it should be a change for the better. Empirical studies of feedback intervention will be conducted in two domains: health behaviour and pro-environmental behaviour with older children and adolescents as target groups. The reasons for these choices will be elaborated on in the theoretical framework section.

The thesis will identify and compare barriers for “ideal” behaviour in the two areas and studies of SMS feedback intervention will be made in an attempt to break through the barriers by targeting children and adolescents’ motivation and resources. The aim is to contribute with knowledge about children and adolescents’ attitudes, behaviour and self-efficacy in order to improve their health and environmental behaviour.

Structure of the thesis proposal
The thesis proposal is organized as follows: First, consumer socialization theory will inform the standpoint taken in this study; my focus is on social cognitive theory and learning processes when it comes to health and pro-environmental behaviour and children and adolescents. Secondly there is a review of literature investigating the issues related to behavioural change and interventions when it comes to health and environmental behaviour. Thirdly the research gaps will be outlined and the conceptual framework presented before the research design is described including the research question this thesis will answer. After that the empirical studies are presented and the research outcome in form of four article abstracts. Finally the time table for this study is presented.

Theoretical framework
This thesis will draw on several theories from different areas in order to explain two types of behaviour change processes. In order to ensure coherence between the theoretical areas and the behaviour types under study, this section will review the central theories applied and point out the research gaps and the contribution of this thesis.

Consumer socialization
The core notion in various social science fields such as political science, anthropology, psychology and sociology is socialization. It covers the process of inheriting norms and customs and providing the individual with the skills and habits necessary for participating in society (Clausen, 1968). All human activity is subject to habit formation implying that a specific future action can be carried out again in the same way with lesser effort (Berger & Luckmann, 1966). The processes of habit formation precede institutionalization, and in any repeated social situation, institutionalization takes place resulting in some degree of social control. Habits have a tendency to persist once they are formed, but the possibility of changing or even dissolving them remains. When habits and the institutional setting are passed on to the next generation “the objectivity of the institutional world “thickens” and “hardens”,
not only for the children, but (by a mirror effect) for the parents as well“ (Berger & Luckmann, 1966, p. 59). This launches the socialization process. The “classic'' understanding of socialization is divided into two types of socialization: 1) primary socialization, which occurs when a child adopts attitudes, values, norms and actions appropriate to individuals as members of a particular family, and 2) secondary socialization, which is the process of learning what is appropriate behaviour as a member of a smaller group within a larger society; this occurs later in life than the primary process (Grusc & Davidov, 2007; Parsons & Bales, 1955; Ritzer, 1992). Therefore it is generally assumed that our basic values are acquired through childhood socialization (Clausen, 1968; Schwartz, 1994).

When it comes to consumer socialization, attitudes, behaviours, norms and values are important elements in the study of the consumer socialization process as defined by Ward (Ward, 1974). It is widely agreed that the sources of socialization influence, the so-called socialization agents, include parents, peers, media and school. Parents are the main agents in children and adolescents’ primary socialization process, in which implicitly and explicitly they teach and transmit consumer-related orientations to the child (John, 1999; Moore & Wilkie, 2005; Ward, 1974). In the secondary socialization process, peers, school and media gain influence (Easterling, Miller, & Weinberger, 1995; John, 1999; Moschis, 1985). This, however, does not imply that socialization is a one-way process. Often children attempt to influence their parents (Grønhøj, 2002; Larsson, Andersson, & Osbeck, 2010; Nørgaard, Brunsø, Christensen, & Mikkelsen, 2007) and this can lead to a ‘reverse’ socialization process (Foxman, et al., 1989; Grønhøj, 2002; Moschis, 1985). Thus, a socialization process can be described as a “bidirectional interactive process” (Kuczynski & Parkin, 2006) where mutual influence and value exchange take place (De Mol & Buysse, 2008; Knafo & Galansky, 2008).

Why consumer socialization in the areas of health and environmental behaviour?
Consumer socialization takes place in a variety of behaviours. Here, the processes are investigated in the areas of health behaviour and pro-environmental behaviour. Modern consumer society as described in the introduction has produced multiple possibilities, but also left mankind with a lot of challenges. Two of the major challenges, which both can be seen as consequences of increased consumption, are 1) increasing levels of overweight and obesity particularly in Western societies (Birch & Fisher, 1998; Birch et al., 2001; Stice, Shaw, & Marti, 2006) and 2) the critical human impact on the natural environment resulting in rising CO₂ emissions as one of the most concerning outcomes (Baslington, 2008; Haustein, Klöckner, & Blöbaum, 2009; Homburg & Stolberg, 2006; Reisch & Gwozdz, 2011; Von Schirnding, 2002).

Rita Turner identified five discourses of modern consumption, including a health discourse and a responsible consumption discourse (Turner, 2010). The discourses are not limited to one message or perspective but contain a range of competing narratives and counter-arguments. Turner describes the health discourse influencing modern consumption as “concerns about the nutritional value and health consequences of the modern US-American diet“ (Turner, 2010, p. 2288). The responsible consumption discourse is described as “urging consumers to help the environment by buying “green” products (...) [and] encouraging consumers to engage in thoughtful, informed, and conscientious purchasing practices“ (Turner, 2010, pp. 2291-2292). These discourses, which to a large extent can be seen in the Danish society as well, are created by consumers and at the same time they influence consumers, media, producers etc. in a number of ways, at different points in time and to varying extent. The way
we are taught to be consumers is very much influenced by the ongoing discourses and the “way of consumption” in our modern society; this is interesting to investigate in a socialization perspective.

**Why socialization of children and adolescents?**

It is commonly agreed that it is important to examine older children and adolescent age categories (i.e., age 10 to 16) separately (I de Bourdeaudhuij, 1997; Nu, MacLeod, & Barthelemy, 1996; Schickedanz, Schickedanz, Forsyth, & Forsyth, 2001; Shepherd et al., 2006; Vereecken, Van Damme, & Maes, 2005). Older children and adolescents are interesting research subjects when it comes to consumer socialization since they are at a very important stage of socialization. According to John, children between 7 and 11 are at the “analytical stage” in the consumer socialization process, while the “reflective stage” includes older children and adolescents aged 11 to 16 (John, 1999, p. 186).

At the analytical stage, enormous changes take place, both cognitively and socially. “This period contains some of the most important developments in terms of consumer knowledge and skills” (John, 1999, p. 187) where information processing abilities are improved, more complex knowledge is achieved, and new perspectives that go beyond their own feelings and motives can be applied. At the reflective stage, the social and cognitive development is further developed and knowledge becomes more nuanced and complex. “A heightened awareness of other people’s perspectives, along with a need to shape their own identity and conform to group expectations, results in more attention to the social aspects of being a consumer, making choices, and consuming brands” (John, 1999, p. 187). However, some of the most important features at the reflective stage is that “attempts to influence parents and friends reflect more social awareness as adolescents become more strategic, favoring strategies that they think will be better received than a simple direct approach” (John, 1999, p. 187).

Older children and adolescents have knowledge and a certain experience with decision strategies and strategies to influence buying processes, which to a high degree are similar to that of adults (Easterling, et al., 1995; Grotnick, Deci, & Ryan, 1997; Nørgaard, et al., 2007). Also, pre-adolescent children nowadays play a greater role in household decision-making (Dotson & Hyatt, 2005; Easterling, et al., 1995; Foxman, et al., 1989; Grønhøj, 2002; McNeal, 1992; Nørgaard, et al., 2007). According to John "there can be no doubt that children are avid consumers and become socialized into this role from an early age. Throughout childhood, children develop the knowledge, skills, and values they will use in making and influencing purchases now and in the future” (John, 1999, p. 207).

In relation to these two modern consumption discourses, *health* and *responsible consumption*, it is relevant to focus on children and adolescents since they are the next generation of full-fledged consumers dealing with the two major challenges described above. They have been socialized as consumers to a certain degree but they still live at home and for the main part they do not pay the electricity bill, they do not do the family’s grocery shopping and other things influencing health and environmental behaviour. Soon, these children and adolescents will leave home and be in charge of their own households. From a societal and economic perspective, it is important that young people learn to live healthily and act environment- responsibly to ensure that these habits and norms will be passed on to new life stages and generations.

In this thesis, *health behaviour* is understood specifically as eating fruit and vegetables and being physically active. However, health behaviour is a wider concept which may include non-smoking, no alcohol consumption and non-risky sexual behaviour, etc. The two types of health behaviour
mentioned are chosen since they have a huge impact on children’s BMI (Body Mass Index). Rising overweight and obesity levels among children and adolescents, especially in the developed countries, are a serious challenge to the health of future generations (Reisch & Gwozdz, 2011; Stice, et al., 2006). It is also well-described in the literature that overweight children and adolescents face the risk of bringing their overweight and obesity into adulthood (Klein-Hessling, Lohaus, & Ball, 2005; Knai, Pomerleau, Lock, & McKee, 2006). Health scientists worry, as do policy makers who eventually will have to finance the treatment of diseases such as cardiovascular diseases and diabetes, which are some of the direct consequences of unhealthy living. In Denmark, the share of overweight children and adolescents aged 4 to 18 has risen from 10.9 per cent in 1995 to 14.4 per cent in 2000-2002 (Matthiessen et al., 2008). It is evident that the western world is facing a fast growing overweight rate: In the last 30 years, the number of overweight children has tripled so now more than 30 per cent of all European children are overweight or obese (Matthiessen, et al., 2008; Reisch & Gwozdz, 2011; Stice, et al., 2006).

Health behaviour is not only a question of preventing overweight but also about well-being. Eating healthily is especially important for adolescents since a lot of biological, psychosocial and emotional changes take place at that age, which demands healthy nutrition and exercise in order to ensure healthy growth and cognitive development (Jenkins & Horner, 2005; Shepherd, et al., 2006; Stevenson, Doherty, Barnett, Mulddon, & Trew, 2007). Furthermore, very often children and adolescents’ eating habits have a long-term effect and are likely to be maintained in adulthood (Hursti & Sjödén, 1997; Lake et al., 2004). It is also well-documented that intake of sufficient quantities of fruit and vegetables (5-6 portions per day) and physical activity (60 minutes per day for children under 18) is health-enhancing. Only 10 per cent of Danish children aged 11-15 meet the recommended “six a day” (Pedersen et al., 2008). At the same time, physical activity levels for children and adolescents are decreasing. Matthiessen et al. compared 2000-2002 and 1995; they found that children and adolescents spend an increasing number of hours on sedentary activities like watching TV and playing computer games. Also, the number of children driven to and picked up from school had doubled and the number of children biking to school had decreased by 30 per cent (Matthiessen, et al., 2008). These are the main reasons why dealing with children and adolescents’ health behaviour is so important.

Pro-environmental behaviour is characterized by “behaviour that consciously seeks to minimize the negative impact of one’s actions on the natural and built world” (Kollmuss & Agyeman, 2002, p. 240). The consequences of children and adolescents’ physical inactivity can be argued to have a negative impact on the environment since it leads to increased electricity consumption, more driving etc. The specific environment-relevant behaviour investigated in this thesis is electricity consumption. Increased purchasing power among teenagers and their parents has led to more devices such as TVs, DVD-players, audio players, laptops etc being installed in adolescent’s rooms. One of the disadvantages is that teenagers will keep the electrical devices going –often even at the same time (Hempel & Lehman, 2005). This is one of the reasons why average young people between 13 and 19 use approximately 20 per cent more electricity than an average adult consumer (Petersen & Gram-Hanssen, 2005). This makes adolescents an important, but largely ignored, target group for any effort to reduce CO₂ emissions from private households. And recent research has documented that CO₂ emissions can be reduced dramatically by changing daily household routines (Dietz, Gardner, Gilligan, Stern, & Vandenberg, 2009; Gardner & Stern, 2008).
A study of 601 Danish families found that the current generation of adolescents (16-18-year-olds) while consuming more electricity than adults is in general less concerned about the environment and less active in this respect than their parents (Grønhøj & Thøgersen, 2009, p. 419). However, there are also studies proposing that children sometimes influence their parents’ and family’s behaviour positively when it comes to pro-environmental behaviour (Easterling, et al., 1995; Ekström, 1995; Grønhøj & Ölander, 2007; Larsson, et al., 2010). These are the main reasons why dealing with children and adolescents’ environmental behaviour is so important.

**Behaviour change in a social cognitive perspective**

Social cognitive theory was developed in the 1960s building on Miller and Dollard’s work on social learning theory (Grusec, 1992; Miller & Dollard, 1941). The psychologist Albert Bandura was and still is one of the leading forces behind social cognitive theory. One of his key assumptions is that, among other things, people learn by observing others and observing the consequences of their actions (Bandura, 1977). By learning from the successes and failures of others, one can avoid making the same mistakes and act more appropriately (Bandura, 2001). The environment, the individual’s own behaviour and the individual’s cognition are believed to influence the social learning process in a reciprocal way; this makes it a complex task to identify socialization agents and the degree and direction of socialization.

Changing behaviour is furthermore a complex process since success depends on several factors. Through the years theoretical developments in this field have put forward factors such as attitudes (Fishbein, 1967), subjective norms and perceived behavioural control (Ajzen, 1991) or self-efficacy and outcome expectancies (Bandura, 2001; Luszczynska, Scholz, & Schwarzer, 2005). In this thesis, the main focus will be on self-efficacy, which is a key construct in social cognitive theory. Self-efficacy is the belief “that one has the power to produce desired changes by one’s actions” (Bandura, 2004, p. 144). Self-efficacy is important for how a person deals with challenges and achieves goals in life. According to social cognitive theory, self-efficacy is influenced by previous experience, knowledge, attitudes, goals, values, the behaviour of others and socio-structural conditions (Bandura, 2001, 2004). Empirical research shows that persons with a high self-efficacy handle challenging tasks better (Luszczyńska & Schwarzer, 2005, p. 132). Hence, Luszczyńska, Scholz and Schwarzer suggest that “the prime factor for influencing behaviour is perceived self-efficacy, that is, people’s beliefs in their capabilities to perform a specific action required to attain a desired outcome” (Luszczyńska, et al., 2005, p. 439). According to this theory, a strengthening of perceived self-efficacy (i.e. empowerment) has a beneficial impact on behaviour both directly and because it affects the person’s goals and outcome expectancies, which are additional antecedents of behaviour (Bandura, 1986; Luszczyńska, et al., 2005). Thøgersen and Grønhøj’s study on electricity-saving behaviour provides evidence for the usefulness of social cognitive theory in identifying psychological, social and structural factors related to electricity saving behaviour (Thøgersen & Grønhøj, 2010). The question is how to strengthen self-efficacy levels to increase the chances of positive behavioural change? In this thesis, I focus on feedback intervention as an option since feedback about the outcomes of a person’s action is an important input to a person’s learning processes.

Intervention “might include strategies designed to increase participants’ sense of mastery and ability to handle difficult situations that might arise during initiation or maintenance of a ... behavior” (Luszczyńska & Schwarzer, 2005, p. 154). When it comes to dealing with obesity and unhealthy living
among children and adolescents in general, behavioural intervention studies have been widely applied (Anderson et al., 2006; Birnbaum, Lytle, Story, Perry, & Murray, 2002; Brug, Oenema, & Ferreira, 2005; I. de Bourdeaudhuij et al., 2010; Hurst & Sjödén, 1997; Shepherd, et al., 2006). This is not the case when it comes to pro-environmental behaviour (however see Zelezny, 1999). There are a number of studies on environmental education targeting adolescents (see i.e. Champman & Sharma, 2001; Walsh-Daneshmandi & MacLachlan, 2006), and recently some interesting studies on feedback and electricity consumption have been published – however, focusing mainly on adults (Abrahamse, Steg, Vlek, & Rothengatter, 2007; Fischer, 2008; Gleerup, Larsen, Petersen, & Togeby, 2010; Grønhøj & Thøgersen, 2009).

In practice, intervention can be implemented in various forms for a selected target group: pre- and post-surveys, education on certain behaviours, web-based or e-mail-delivered intervention, forming implementation intentions (Verplanken & Faess, 1999) or action planning, where a goal and a timeframe for behaviour change is set (Luszczynska, Tryburcy, & Schwarzer, 2007; Stice, et al., 2006). According to Bandura, one of the biggest challenges when it comes to health behaviour is that “long delays between action and noticeable results further discourage efforts at socially significant changes” (Bandura, 2001, p. 18). This is obviously also true for pro-environmental behaviour where the distance between action and results can seem even longer.

**SMS-based feedback intervention**

Feedback intervention can be a means to change behaviour and it can be understood as directed attempts to change behaviour among participants via information and exercises that by the means of feedback on specific behaviours will make the participants reflect on their own behaviour over a course of time (Schultz, 1999). According to Kluger and DeNisi, feedback intervention “change the locus of attention among 3 general and hierarchically organized levels of control: task learning, task motivation, and meta-tasks processes” (Kluger & DeNisi, 1996, p. 254). One of their main conclusions is that the effect of feedback intervention is moderated by the nature of the task. Also, content and form can have an impact on the perception of the message so the formulation and presentation of the feedback is important (Corner & Hahn, 2009; Myers, 2009; Sherman, Mann, & Updegraff, 2006). Further, precise and punctual feedback on the effects of behavioural change is a well-documented way of enhancing experienced self-efficacy (Kluger & DeNisi, 1996; Luszczynska, et al., 2007). Feedback on the outcomes of one’s actions is important input for forming expectations about which results to expect when acting towards a goal in a specific area. It is also a way of reducing the effect of a delay between action and result (Kluger & DeNisi, 1996). Mobile phones Short Message Service (SMS) is a relatively new feedback tool (Fjeldsoe, Marshall, & Miller, 2009).

To an increasing extent socialization of young consumers happens through digital media, which have turned "the concepts of identity, culture, language, relationship with one's body, time and space (…) upside down" (Batat, 2008, p. 4). Access to digital and social media, like mobile phones, SMS, Internet, Facebook, Twitter, etc., gives children and adolescents today completely different possibilities of access to information and communication than only 20 years back (Batat, 2008; Biocca, 2000; Brown & Cantor, 2000). Media are increasingly interactive and multisensory (Van Cleemput, 2010), and young people are “active media consumers who choose, interpret and apply media in a variety of ways” (Brown & Cantor, 2000, p. 3). Sending text messages from mobile phones is one of young people’s preferred communication tools (Faulkner & Culwin, 2005; Fjeldsoe, et al., 2009; Phau & Teah,
2009), because it “allows for instantaneous delivery of short messages (maximum 160 characters) directly to individuals at any time, place or setting” (Fjeldsoe, et al., 2009, p. 165). Hence, SMS-based feedback intervention first of all appeals to young people because of the media. For an interventionist, one of its appeals is its relative inexpensiveness in a large-scale setting compared to, for example, educating children and adolescents face-to-face. Software is basically all that is needed to register and send out feedback (Gleerup, et al., 2010).

One advantage of SMS-based feedback intervention is that messages can be tailored making the intervention more applicable and relevant for the individual participant (Bjældager, Ringgaard, Bech, & Nielsen, 2009, p. 23). In terms of behaviour change intervention, mobile telephone short-message service has not been widely applied, but the body of literature on this tool is growing (e.g. Gleerup, et al., 2010). In a review of studies where SMS intervention was used to target different types of health behaviour, Fjeldsoe et al. conclude that SMS-delivered intervention has positive short-term behavioural outcomes. However, “the quality of studies in this emerging field of research needs to improve” (Fjeldsoe, et al., 2009, p. 165).

Targeted research gaps and implications

This thesis will investigate a range of theoretical concepts in relation to health behaviour and environmental behaviour. The theoretical field is broad and therefore the targeted research gaps will be pointed out and the contributions of this thesis put forward. The targeted gaps relate to the overall frame (consumer socialization and social cognitive theory), the tool (SMS-based feedback intervention), the target group (older children and adolescents) and the two areas of behaviour (health and environmental behaviour).

As described above, the notion of consumer socialization has developed over the last 40 years. For long is has centred on the processes related to purchase and decision-making, including skills acquisition and the ability to process information. Recently it has been suggested that the scopes of consumer socialization “encompass life-long consumer socialization, different life events and spheres of consumption, dialogs, negotiations, and translations, as well as the socio-cultural context in which socialization occurs” (Ekström, 2006). This thesis will build on the latest stream of consumer socialization literature and look at the less researched, broader perspectives of consumer socialization. The thesis will contribute with findings in the two behavioural areas discussed and argue that these are important, yet under-researched examples of consumer socialization.

When it comes to intervention, the literature is vast – especially in the health area. Intervention studies cover a wide range of means, for example, increasing knowledge on health by means of teaching by an expert, making children taste new healthy products, measuring their BMI over time, etc. When it comes to feedback intervention, where the participant is offered a tailored learning process, the literature is scarcer. However, since some reviews of the intervention literature do not consider feedback intervention separately (i.e. Stice, et al., 2006), it may seem that they are fewer than they really are. Also, the number of publications on feedback intervention in the health area is increasing (de Sa & Lock, 2008; Fjeldsoe, et al., 2009; Kluger & DeNisi, 1996) and several of them include adolescents (Anderson, et al., 2006; Shapiro et al., 2008). According to Luszczynska and Schwarzer’s review of studies on increasing self-efficacy in order to obtain a healthier behaviour “self-efficacy (…) [is] among the factors most consistently and strongly associated with higher consumption of fruit and vegetables” (Luszczynska & Schwarzer, 2005, p. 139). Hence, focusing on self-efficacy in relation to
intake of fruit and vegetables and physical activity levels is not new, but the tool studied in this thesis, SMS, is.

In the field of environmental behaviour, studies have investigated feedback and families’ electricity consumption, but targeting adults only (Christiansen, Kanstrup, & Grønhøj, 2009; Fischer, 2008; Gleerup, et al., 2010; Grønhøj & Thøgersen, 2009; Larsson, et al., 2010). A database search for feedback intervention targeting children and adolescents hardly gave any hits (see however Meinhold & Malkus, 2005; Uzunboylu, Cavus, & Ercag, 2009), and studies combing self-efficacy and reduction of electricity consumption seem to be almost non-existing. The research design of the two studies (described below) will make it possible to investigate the effect of SMS-based feedback and see whether traditional education by an expert can be boosted if supplemented with SMS-based feedback. Up till now environmental education in schools has produced mixed results (Thøgersen, 2005), and a recent study found no significant effect of an energy advisor teaching energy awareness and responsible energy-related behaviour in schools (Jensen, Fjordbak, Gram-Hanssen, & Rasmussen, 2009). Hence, there is a need for research on how this type of education can be made more effective. This study can test whether there are exploitable synergies between traditional education (on health or the environment) in schools and SMS-based feedback. This thesis therefore aims at a deeper insight into the when and how of both feedback and traditional education.

Behavioural change is hard to obtain by means of traditional media campaigns (such as leaflets, television advertisements, magazines and newspapers). Evaluations have shown that one of the reasons is that the campaigns are not efficient or specific enough (McKenzie-Mohr, 2000). According to Bjældager et al., digital intervention seems to have a better effect on young people compared to adults (Bjældager, et al., 2009), but studies of digital intervention effects among young people are lacking. Also, there seems to be other generation differences. For example, Gleerup et al. (2010) found that when given a choice between e-mail and SMS as feedback communication tool, a majority of the participating adults chose to receive feedback via e-mail. It thus seems that e-mail is the parent generation’s preferred communication channel for purposes such as this, while SMS in general is the younger generation’s preferred communication tool. For example, attempts to promote smoking cessation via SMS targeting young people (the project Xhale launched by The Danish Cancer Society) have been successful (Munk-Petersen, 2008). Against this background and the social media revolution in general, SMS-based feedback seems an obvious tool for communicating with older children and adolescents on these matters. A review of SMS-based health intervention (Fjeldsoe, et al., 2009) indicates short-term behavioural effects but it also underlines the necessity of improving the theory, of investigating the feedback processes and of looking at the long-term effect of SMS-based intervention. In terms of feedback intervention, tailored feedback to each participant is recommended (Bjældager, et al., 2009; Fjeldsoe, et al., 2009). To a very limited extent this approach has been tested in relation to self-efficacy and therefore it is relevant and interesting to see how tailored feedback will affect the selected behaviours. The tool’s effectiveness in the two areas of behaviour is expected to differ due to the nature of the behaviours. Hence, by studying the effect of SMS-based feedback on health and environmental behaviour among adolescents, new important insights about the effect and mechanisms behind behavioural feedback via a modern communication technology can be obtained.

Through the studies planned, a deeper insight into older children and adolescents’ barriers and motivation for behavioural change in the two areas will be obtained. A behavioural change will be for the benefit of the individual as well as for society in terms of the long-term effect of healthier and pro-
environmental living. This is of interest to traditional interventionists in the two fields, such as dieticians and energy counsellors, who already teach in schools. It may seem paradoxical that energy companies, selling electricity to households, want to decrease electricity consumption. This is, however, determined by law reflecting the fact that policy makers have realized that small changes in each household can contribute to a big overall reduction in CO₂ emissions. Feedback via SMS is expected to be cheaper and more efficient than traditional campaigns in terms of influencing adolescents’ fruit and vegetable consumption, physical activity levels and electricity consumption behaviour.

**Conceptual framework**

In the first phase of the thesis work, two empirical studies will be conducted in the areas of health behaviour and pro-environmental behaviour. Both studies will investigate barriers and facilitators for specific behaviours. Questionnaire items will be based on social cognitive theory and will identify attitudes, values, past behaviour, perception of the behaviour of others, social encouragement and support, self-efficacy levels, outcome expectations, proximal goals/intentions, socio-structural factors (barriers/facilitators) and actual behaviour (Bandura, 2004). However, the main focus will be on self-efficacy levels in the learning process supported by the SMS-based feedback intervention.

In the second phase of the thesis work, the social cognitive framework will provide a foundation for understanding the effect of the SMS-based feedback intervention and evaluate it as a tool for consumer socialization among children and adolescents. The proposed framework for the investigation of consumer socialization via SMS-based feedback intervention is presented in figure 1; it is inspired by Bandura’s social cognitive theory (Bandura, 2004, p. 146).

![Conceptual framework](image_url)
Figure 1 illustrates how the social learning process, with self-efficacy as one of the main concepts, is influenced by a feedback intervention, which again influences overall consumer socialization. Feedback intervention can influence several concepts in the social learning process – depending on its implementation.

The following constructs from social cognitive theory are incorporated in the framework:

- Past behaviour – i.e. previous consumption, mastery experience
- Perception of behaviour of others – mainly family and peers
- Social support and encouragement – mainly from family and peers, but also school, media etc.
- Distal goals – values, motivation, attitudes
- Self-efficacy – belief in oneself being able to produce desired outcomes by one’s actions
- Outcome expectations: outcomes expected from changing or not changing behaviour
- Proximal goals – intentions related to behaviour
- Socio-structural factors – barriers and facilitators for behavioural change
- Actual behaviour – what is done; the result of the intervention: behavioural change or not

The model may need modification/refinement when the analyses of the empirical studies have been carried out.

**Research question**

Based on the conceptual framework, this thesis will answer the following research question:

*How does SMS-based feedback intervention influence perceived self-efficacy and behaviour among older children and adolescents in the areas of health behaviour and pro-environmental behaviour?*

The thesis will, as indicated, include two empirical studies. A mixed methods approach is applied and will include quantitative and qualitative sub-studies in both studies. In order to evaluate SMS-based feedback intervention as a tool for behavioural change (articles 3 and 4), a comparative study approach is applied. However, the studies in each behavioural area will also by themselves contribute separate findings (articles 1 and 2) (see below).

**Empirical studies**

In order to investigate whether children and adolescents’ perceived self-efficacy and behaviour can be influenced by SMS-based feedback, the empirical work for this thesis will consist of studies on both health behaviour and pro-environmental behaviour. The main study in both areas will be a field experiment involving children, adolescents and parents in different ways in order to influence their behaviour. These intervention studies will mainly be quantitative, measuring longitudinal changes, but in both areas also qualitative studies are carried out in order to obtain a deeper understanding of the psychological and social mechanisms related to SMS-based feedback and behavioural change.

When studying children and adolescents, it is important to take the different cognitive development stages and the competences and abilities of the child/adolescent into account, for example when designing feedback interventions and surveys. Also, ethical issues must be considered and parents
have to give their consent. These considerations will be touched on in the description of the empirical studies.

Both studies will focus on a limited number of behaviours (fruit and vegetable consumption and physical activity levels in one and electricity consumption in the other) in order to be able to measure and evaluate possible behavioural changes. In order to compare the applicability of SMS-based feedback method across fields, the intervention studies in both areas will be designed as similarly as possible from the outset.

The studies in the two areas have the following things in common:

- Participants are children and adolescents aged 11-12 and 15-16
- The participants will be divided into three main experimental groups:
  1) Participants filling in surveys and participating in an SMS-based feedback intervention
  2) Participants filling in surveys and participating in an SMS-based feedback intervention and a lecture from an expert (dietician in the health study and an energy counsellor in the environmental study)
  3) Participants filling in surveys
- One parent of each participant is invited to fill in surveys
- The SMS-based feedback intervention will have a duration of approximately 12 weeks
- The formulation of feedback will be kept in a neutral, factual communication style

**Health behaviour study**

This study is carried out in the framework of the research project “Step by Step change of children’s preferences towards healthier foods” (financed by The Strategic Research Council, number 2101-06-0002, running 2007-2011). The study consists of qualitative interviews with families participating in a pilot project (2008) and an intervention study with SMS-feedback including a pre- and post-survey, which was completed in the autumn 2010.

Consumption of fruit and vegetables and physical activity levels are the focus of the health study. These three behaviours are chosen based on a pilot study also carried out as a part of the “Step by Step” project (in 2008). In the pilot study, the issues were fruit, vegetables and soft drinks and here the active role of parents in the SMS-based feedback was included; it was, however, shown to have a limited effect. Instead of reporting on (a hopefully decreasing) consumption of soft drinks, it was decided to report on (hopefully increasing) levels of physical activity. It was expected to make more sense for the participants to increase all types of monitored behaviour.

It is a well-established fact that eating fruit and vegetables is beneficial to one’s health and so is physical activity. Diets that include large quantities of fruit and vegetables are believed to reduce the risk of nearly all types of cancer and lower heart disease risk (Brug, de Vet et al. 2006). A diet with as much as six hundred grams or more is recommended by various health organizations, but as mentioned in the introduction, only 10 per cent of Danish adolescents meet this goal (Matthiessen, et al., 2008). In Denmark, the recommendation on daily physical activity is at least 60 minutes for children and adolescents and 30 minutes for adults. Physical activity is any body movement that works your muscles and uses more energy than you use when resting (The Danish National Health Board 2011).
This study is not concerned with obese or overweight children as such. My focus will be on “normal” children and adolescents and the barriers and motivational factors related to their healthy eating and physical activity behaviours. As a result, participants were sampled class-wise from elementary schools – both urban and rural area schools in the Central Denmark Region. Sampling criteria (the same as in the pilot study) included school size, whether they had hot meal services or not and whether they had previously engaged in any targeted health education. Participants were recruited through schools since the project also aimed at testing the impact of “traditional” health education in the form of sessions with a dietician from Centre of Public Health, Central Denmark Region. Additional advantages of recruiting through schools are: 1) a higher participation/answering rate is likely, 2) cost-effectiveness, and 3) learning is a key factor in the project, and when the project assistants visit the schools with questionnaires and instructions, this will work more or less like a typical learning situation. Two age groups were chosen: 5th graders (10-11 years old) and 9th graders (14-15 years old). According to John (1999, pp. 186-187), different behaviour patterns can be expected in the two age groups since they are at different cognitive stages in the socialization process. Moving from the analytical stage (ages 7-11) to the reflective stage (ages 11-16), the knowledge development becomes more abstract and the complexity in decision-making skills and purchase influence strategies increases (John, 1999, pp. 186-187).

The qualitative study on health behaviour consists of 38 interviews (conducted autumn 2008) with families participating in the pilot study. The intervention involved 250 children (10-11 years) from 12 schools. They were divided into three groups, groups 1 (children only) and 2 (children and parents) participated in the SMS-based intervention, while group 3 served as a control group. Before the intervention, participants set an individual weekly goal for the intake of fruit, vegetables and sweet drinks. During the intervention they reported their daily intake by SMS. They immediately received feedback reporting the distance from their goal. Goals could be adjusted between SMS-weeks. Two months after the intervention, 38 children and their families (varying in terms of socio-demographic criteria and group involvement) volunteered to do a 1½–2-hour long interview about the mechanisms behind changes or no changes, how effects were obtained etc. The semi-structured interview guide focused on habits, family interaction, self-regulation, goal-setting and self-efficacy.

The quantitative study on health behaviour consists of a three-month intervention period and two surveys: one before the intervention and one after (conducted autumn 2010). 70 classes from 17 schools were recruited with 34 5th grade classes and 36 9th grade classes. The surveys were filled in by approx. 1500 children and one of their parents (approx. 800), who were assigned to three experimental groups (see table 1). The survey was identical across groups, but differed between surveys 1 and 2 and between children and parents. The survey was based on feedback from the pilot study and three pre-tests with children in the target group. The survey items included questions related to the concepts presented in the conceptual framework, testing three different scales of self-efficacy.

The intervention period was 11 weeks. It may be argued that a longer intervention period is necessary for participants to start a behavioural change process, but based on experience from the pilot study, it was decided to limit the period in order to minimize participant drop-out. Stice et al. also found that relatively brief interventions created larger effects (Stice, et al., 2006, p. 683). The first visit was in September 2010 and the intervention ended in November 2010, which seemed to fit well with the semester and the teachers’ teaching program. Recruitment was cleared with the principals who gave
permission to contact and get permission from teachers. With permissions obtained, the parents were informed about the intervention via a letter saying that it was voluntary for the children/adolescents to participate. A mobile phone and payment of text messages (approx. 15 DKK in total) were a prerequisite for participation. Pupils who did not have access to a mobile phone could borrow one and did not have to pay for the text messages. When the intervention started, the pupils in groups 1 and 2 were asked to set weekly goals for their individual consumption of fruit, vegetables and their physical activity level. The pupils were shown how to measure fruit and vegetables in “units” used by dieticians to measure intake (1 unit = 100 g = 1 apple) and activity level (1 unit = 1 minute). A counting form was handed out to each pupil (see appendix 1).

Every evening in the first week, the participants received an SMS requesting them to state their intake and activity level in units. After answering, the participants received feedback stating in neutral terms the total intake of fruit and vegetables and activity level compared to the self-set goals (see appendix 2). At the end of the first week, the feedback summed up the whole week. In the following week, participants had the option of adjusting their goals before the second round of SMS-reporting. This continued with a total of five weeks of SMS-reporting with four weeks as breaks in between. Participants were given a folder explaining the principles of SMS-feedback, which included a question-and-answers section in case of problems; also there was information about a hotline in case of problems or wish to drop out.

In order to motivate SMS-reporting, a prize worth DKK 5000 was given to the class sending the largest number of the possible test messages. In other words, the prize did not depend on the consumption of fruit and vegetables and physical activity levels but on whether the participants remembered to send their daily SMS.

The intervention study project design can be seen in Table 1.

<table>
<thead>
<tr>
<th>Week</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project assistant visits the class</td>
<td>Project assistant visits the class</td>
<td>Project assistant visits the class</td>
</tr>
<tr>
<td></td>
<td>- Information about project</td>
<td>- Information about project</td>
<td>- Basic information about project</td>
</tr>
<tr>
<td></td>
<td>- Instruction in SMS and counting form</td>
<td>- Instruction in SMS and counting form</td>
<td>- Filling in survey 1 (pupils)</td>
</tr>
<tr>
<td></td>
<td>- Registration and goal-setting via SMS</td>
<td>- Registration and goal-setting via SMS</td>
<td>- Survey 1 and letter to parents</td>
</tr>
<tr>
<td></td>
<td>- Filling in survey 1 (pupils)</td>
<td>- Filling in survey 1 (pupils)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Survey 1 and letter to parents</td>
<td>- Survey 1 and letter to parents</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>SMS week 1: daily SMS + feedback based on goal</td>
<td>SMS week 1: daily SMS + feedback based on goal</td>
<td>No activity</td>
</tr>
<tr>
<td>3</td>
<td>Possibility to change goal via SMS</td>
<td>Possibility to change goal via SMS</td>
<td>No activity</td>
</tr>
<tr>
<td>4</td>
<td>SMS week 2: daily SMS + feedback based on goal</td>
<td>SMS week 2: daily SMS + feedback based on goal</td>
<td>No activity</td>
</tr>
<tr>
<td>5</td>
<td>Possibility to change goal via SMS</td>
<td>Class session with dietician</td>
<td>No activity</td>
</tr>
<tr>
<td></td>
<td>- Possibility to change goal via SMS</td>
<td>Possibility to change goal via SMS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Filling in survey 1 (pupils)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Survey 1 and letter to parents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SMS week 3: daily SMS + feedback based on goal</td>
<td>SMS week 3: daily SMS + feedback based on goal</td>
<td>No activity</td>
</tr>
<tr>
<td>7</td>
<td>Possibility to change goal via SMS</td>
<td>Possibility to change goal via SMS</td>
<td>No activity</td>
</tr>
<tr>
<td>8</td>
<td>SMS week 4: daily SMS + feedback based on goal</td>
<td>SMS week 4: daily SMS + feedback based on goal</td>
<td>No activity</td>
</tr>
<tr>
<td>9</td>
<td>Possibility to change goal per SMS</td>
<td>Possibility to change goal per SMS</td>
<td>No activity</td>
</tr>
<tr>
<td>10</td>
<td>SMS week 5: daily SMS + feedback based on goal</td>
<td>SMS week 5: daily SMS + feedback based on goal</td>
<td>No activity</td>
</tr>
<tr>
<td>11</td>
<td>Project assistant visits the class</td>
<td>Project assistant visits the class</td>
<td>Project assistant visits the class</td>
</tr>
<tr>
<td></td>
<td>- Filling in survey 2 (pupils)</td>
<td>- Filling in survey 2 (pupils)</td>
<td>- Filling in survey 2 (pupils)</td>
</tr>
<tr>
<td></td>
<td>- Survey 2 and letter to parents</td>
<td>- Survey 2 and letter to parents</td>
<td>- Survey 2 and letter to parents</td>
</tr>
<tr>
<td></td>
<td>- Project feedback</td>
<td>- Project feedback</td>
<td>- Project feedback</td>
</tr>
</tbody>
</table>

**Table 1: Project design, health study**
Environmental behaviour study

Just as the health study, the empirical study consists of a field experiment with an intervention supplemented with surveys and qualitative interviews. Reduction of electricity consumption is selected as the focal behaviour for a number of reasons: 1) Average teenagers use 20 per cent more electricity than an average adult, 2) electricity is used every day for a variety of purposes in a teenager’s life and 3) electricity is measureable via electrical meters, which enables a comparison of the trustworthiness of SMS reports with actual measured consumption.

The qualitative study will consist of interviews with participating children/adolescents and their families in order to get a deeper understanding of the families’ perception of SMS feedback and its effects. Besides getting more detailed knowledge about the effects of SMS-based feedback, the qualitative data help to ensure that the results from the quantitative part are not over- or misinterpreted. There will be about 20 family interviews with 10 from each of groups 1b and 2a (see Table 2).

The quantitative study will include approx. 800 adolescents and (some of) their parents. They will fill out questionnaires covering the social cognitive theory concepts described in Figure 1 related to electricity consumption before and after a three-month intervention period and again six month later. The 800 adolescents (5th and 9th grade as in the health study) will be recruited class-wise through 10-12 schools in Southern Jutland. In the recruitment of schools, important criteria for electricity consumption such as family income, size of residence and household size will be taken into account (Petersen & Gram-Hanssen, 2005; Jensen et al., 2009). Also, it will be checked whether the schools have previously engaged in environmental education. The reasons for using schools for recruiting are the same as in the health study and the recruitment process will also be cleared with principals, teachers and parents. In order to motivate the adolescents to participate, a prize will be awarded to the class sending the largest number of the possible SMS’s.

In order to test the effects of SMS feedback and the combination of feedback and education at school, adolescent participants will be class-wise, but randomly, divided into six experimental groups as shown in table 2.

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of participants (With an average of 20 pupils per class)</th>
<th>Secondary electric meter installed (in the adolescent’s room– selected devices)</th>
<th>Energy advisor visits classes</th>
<th>Feedback - Phase 1: Goal and feedback for consumption in adolescent’s room (t)</th>
<th>Phase 2: Goal and feedback for consumption in adolescent’s room (t) and/or the household’s electricity consumption (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>200 (10 classes) + 200 parents</td>
<td>Yes</td>
<td>Yes</td>
<td>t</td>
<td>t+h</td>
</tr>
<tr>
<td>1b</td>
<td>200 (10 classes) + 10 families</td>
<td>Yes</td>
<td>No</td>
<td>t</td>
<td>t+h</td>
</tr>
<tr>
<td>2a</td>
<td>100 (5 classes) + 10 families</td>
<td>No</td>
<td>Yes</td>
<td>None – no SMS activity</td>
<td>h</td>
</tr>
<tr>
<td>2b</td>
<td>100 (5 classes)</td>
<td>No</td>
<td>No</td>
<td>None – no SMS activity</td>
<td>h</td>
</tr>
<tr>
<td>3a</td>
<td>100 (5 classes) + 100 parents</td>
<td>No</td>
<td>Yes</td>
<td>None – no SMS activity</td>
<td>None – no SMS activity</td>
</tr>
<tr>
<td>3b</td>
<td>100 (5 classes) + 100 parents</td>
<td>No</td>
<td>No</td>
<td>None – no SMS activity</td>
<td>None – no SMS activity</td>
</tr>
</tbody>
</table>

Table 2: Group tasks
The six groups vary on the following variables:

- Whether or not they will have a secondary electricity meter (installed by the energy company, Syd Energi) connected to selected devices in the adolescent's room
- Whether or not they are visited by an energy advisor in class
- Whether or not they get feedback on electricity consumption in the adolescents' room and/or the household's electricity consumption (data provided by Syd Energi)

The intervention period will be divided into two phases: In Phase 1, a daily feedback SMS will be limited to electricity consumption in the adolescent's own room. In Phase 2, the feedback will be extended to the household's electricity consumption (and for some groups both the adolescent's room and the household consumption). Participating households must authorize remote reading of their electricity consumption in the intervention period and the parents must authorize their child's participation. Communication with parents and schools is very important and will be carried out via a webpage, information letters and a hotline. When the intervention starts, the adolescents in groups 1 and 2 are requested to set weekly goals for their individual electricity consumption/savings (measured in kWh and per cent) in their room. Before setting the goals, they will be informed about “typical” consumption levels and what realistic savings could be. During Phase 1, the adolescents will receive a daily SMS with yesterday’s consumption (from data collected by the secondary electricity meter) compared with the weekly goal. On a weekly basis, they receive feedback for the whole week and subsequently they are offered the opportunity to adjust their goal in case it is too ambitious or too easily obtained. In Phase 2, the weekly feedback will (for some groups) also include the entire household's electricity consumption.

Syd Energi has agreed to provide some of the required electrical meters and an experienced energy advisor to teach electricity saving behaviour. For continued implementation after the project, it is important that the SMS-software system is neither too expensive nor too complicated. This can be ensured by building on Syd Energi's existing platforms. Software will be developed to register data from electrical meters and calculating the feedback. There will also be a web-based interface where participants can monitor the development in their consumption etc. The secondary electrical meter (without visible counter) will be hooked up to lamps, computer, TV, DVD player etc. in the adolescent's room. Naturally, the number and types of units will vary among the participating adolescents and also their electricity consumption – for example, does the teenager have a new flat screen TV or has he taken over the family's old picture tube TV? The project will register each participant's electric equipment. Also each participant will get a list stating the electricity consumption of different units and brands. It is also possible that in the intervention period some of the participants will choose to, for instance, watch TV in the living room rather than in their own room. To control for this and for possible effects of the intervention on the family's total electricity consumption, the household’s total electricity consumption will be measured before, during and after the intervention.

The project design will be pre-tested in a 5th and a 9th grade class. The pre-test will consist of a short test period with SMS followed by a class discussion on feedback type (individually or household), intensity (daily or weekly), SMS-language, information material, surveys and the general
understanding of kWh, feedback, calculation of percentages in order to adjust the intervention to the specific age levels.

**Research outcome**
The thesis will consist of four articles, which will be described below. The coherence between the articles is shown in Figure 2:

![Figure 2: Coherence of articles](image-url)
Article 1: Effects of an SMS-based feedback intervention on health behaviour among children and adolescents

Results to be presented at the public dissemination of the research project Step by Step change of children's preferences towards healthier foods – August 23, 2011.

Suggested outlet: Health Education & Behavior or Young Consumers

Abstract

The aim of this study is to investigate whether SMS-based feedback can raise self-efficacy and consumption of fruit and vegetables as well as physical activity among older children and adolescents. It will also be investigated how class education by a dietician influences behaviour and whether the effect of such education is boosted if adolescents at the same time receive SMS-based feedback.

The intervention involved 1476 children (5th and 9th grade) from 17 schools in the Central Denmark Region and their parents. The participants were divided into three groups, groups 1 (only SMS) and 2 (SMS and education by a dietician) participated in the SMS-based intervention, while group 3 served as a control group. All three groups (including parents) filled in questionnaires before and after the intervention. The survey focused on social cognitive constructs like self-efficacy, mastery experience, outcome expectations and the influence of peers and family. Before the intervention, each SMS participant set a weekly goal for the intake of fruit and vegetables and for physical activity. During the intervention, they reported their daily intake by SMS. They immediately received feedback stating the gap to their goal. Goals could be adjusted between SMS-weeks.

A comparative analysis of self-efficacy and behaviour between the three experimental groups is presented and theory-derived hypotheses tested. Factors like age, gender, BMI and baseline consumption/activity levels will be checked, as well as SMS-data and the participant’s persistence in the intervention. It is expected that the effect of the SMS-based feedback intervention will be strongest for children and adolescents who at base level consumed low levels of fruit and vegetables/had low physical activity levels. Based on the study, recommendations on design of feedback intervention will be given.

Article 2: Effects of an SMS-based feedback intervention on children and adolescents’ electricity consumption

Suggested outlet: Journal of Environmental Education or Environment & Behavior

Abstract

The aim of this study is to investigate whether SMS-based feedback intervention can raise self-efficacy and reduce electricity consumption among older children and adolescents. It will also be investigated how class education by an energy counsellor influences behaviour and whether the effect of such education is boosted if adolescents at the same time receive SMS-based feedback.

The intervention involves 800 children (5th and 9th grade) from schools in the Southern Denmark Region and their parents. Six experimental groups will be subjected to different schemes as to whether
or not a secondary meter is installed, whether or not they have sessions with an energy counsellor at school, and whether or not they get feedback on electricity consumption in the adolescent’s room and/or the household’s electricity consumption. All groups and parents answer surveys before and after the 12-week intervention period. The survey focuses on social cognitive constructs like self-efficacy, mastery experience, outcome expectations and the influence of peers and family. Before the intervention, SMS participants set an individual weekly goal for their electricity consumption (either for the adolescent’s room and/or the household). During the intervention they get feedback (based on secondary meter measures for the teenage room and/or household meter measures) stating how close or far they are from their goal. Goals can be adjusted between SMS-weeks. After the intervention, interviews with participants will be carried out in order to obtain in-depth knowledge about their attitudes and behaviour in relation to electricity consumption. Also the reverse socialization process going from children to parents will be dealt with.

A comparative analysis of self-efficacy and behaviour between experimental groups is reported. Factors such as age, gender and baseline consumption levels will be checked, in addition to SMS-data and the participants’ persistence in the intervention. Since basically there are no studies on feedback intervention targeting young consumers’ electricity consumption, this study will provide the first data on the barriers and facilitators and on whether SMS-based feedback is an effective tool for behaviour change in this area.

**Article 3: Healthy habits via SMS? Participant evaluation of an SMS-based feedback intervention**

*Accepted for oral presentation at the International Association for Research in Economic Psychology conference 2011 in Exeter, July, 12-15.*

*Suggested outlet: Health Education or Journal of Health Communication*

*Abstract*

Can children be taught healthy eating habits by SMS? The objective of this qualitative study is to assess an SMS intervention’s short- as well as long-term effects on health behaviour and whether children can influence their families’ health behaviour when it comes to increasing the consumption of fruit and vegetables and cutting down on sweet drinks.

This study on changing health-related behaviour is based on social cognitive theory focusing on knowledge, self-efficacy and goal-setting. The key construct, self-efficacy, is the belief that one has the power to produce desired changes by one’s actions. By giving precise and punctual feedback in cases where the natural setting does not provide this feedback, it is possible to enhance the experienced self-efficacy and increase the likelihood of positive behavioural change. The feedback clarifies the outcomes of the individual’s actions thereby giving a strong indication of the results the individual can expect to achieve from future actions.
The qualitative study reported here was part of a large intervention study involving 250 children (aged 10-11) from 12 schools. They were divided into three groups, groups 1 (children only) and 2 (children and parents) participated in the SMS-based intervention, while group 3 served as a control group. Before the intervention, participants set an individual weekly goal for the intake of fruit, vegetables and sweet drinks. During the intervention they reported their daily intake by SMS. They received immediate feedback stating how close or far they were from their goal. Goals could be adjusted between SMS-weeks. Two months after the intervention, 38 children and their families (differing in terms of socio-demographic criteria and experimental group) volunteered to do a 1½-2-hour interview about the mechanisms behind the change or lack of same, how effects were obtained etc. The semi-structured interview guide focused on habits, family interaction, self-regulation, goal-setting and self-efficacy.

Content analysis of the interview transcripts revealed significant noteworthy differences between groups. All groups reported to have obtained an increased awareness of healthy eating, and groups 1 and 2 in particular reported relatively big improvements in their healthy eating behaviour during the intervention. Parents’ participation did not seem to make any difference. In several cases, children influenced parents by requesting the purchase of specific healthy items and by asking for healthier preparation of food. In the long run, mainly SMS-participants reported continuous, however smaller, changes in their behaviour. Most of them seemed to lose motivation when the feedback was discontinued.

However, strategies to achieve their expressed goals were to some extent still followed. The strongest long-term finding consisted of an enduring awareness and improved communication on healthy eating in many families in groups 1 and 2. The results suggest that SMS-based feedback intervention can improve children's awareness, and to some extent behaviour, when it comes to healthy eating and that the effect is due to empowering children to take on more responsibility with respect to their own consumption habits. Thus, the study provides a better understanding of how SMS-feedback is received and acted on in families, and particularly, why SMS-based feedback works, both in the short and the long term.

Article 4: SMS-based feedback: A useful tool for behavioural change among children and adolescents?

Suggested outlet: Journal of Consumer Behavior or Journal of Social Psychology

Abstract

The aim of this paper is to evaluate SMS-based feedback intervention as a means to further behavioural change in children and adolescents. The paper will place feedback intervention in a social cognitive theory framework and will argue that SMS-based feedback intervention can contribute to the overall consumer socialization of children and adolescents.

The first part of the paper will review the literature on SMS-based feedback intervention targeting children and adolescents. The second part of the paper will look at the empirical evidence obtained
from two studies in the health and environmental area, respectively. The paper will seek to answer the following questions:

- Can SMS-based feedback intervention be an effective way to change behaviour (comparison between health study and environmental study)?
- Is SMS-based feedback intervention a generally applicable tool for behavioural change or is it only useful with some groups under specific conditions? (experimental groups, age, gender etc.)?
- Which design characteristics seem to be important, taking both measured effect and participant evaluations (obtained through qualitative studies) into account?

**Time table**

The plan in Table 3 shows how the above mentioned thesis elements and the compulsory PhD activities can be organised to meet the thesis deadline set for July 2013.

<table>
<thead>
<tr>
<th></th>
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<td>Teaching</td>
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<td>Courses</td>
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<td>Research exchange</td>
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<td>Seminars/conferences</td>
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*Table 3: Time table*

**Teaching**

So far I have taught qualitative method tutorials, marketing seminars, supervised a bachelor thesis, graded exam papers and I have given one lecture in marketing management – a total of approx. 420 hours.

**Courses**

I have participated in the courses described for the first two semesters, and I plan the remaining courses as shown below:

1st semester  
- Quantitative research methods (DOME)  
  - EDEN Doctoral Seminar on Interpretive Research Methods  
  5 ECTS

2nd semester  
- Food, Medicine and Philosophy in East and West  
  (FOOD Denmark)  
  6 ECTS
EDEN Doctoral Seminar on Doctoral Dissertation Writing 4 ECTS
4th semester  EDEN Doctoral Seminar on Research Methods in Marketing 4 ECTS
           EDEN Doctoral Seminar on Consumer Behaviour 4 ECTS
           STEEP PhD Course (Dep. Of Business Administration, AU) 5 ECTS
5th semester  Compulsory dissemination course 1 ECTS
Total 33 ECTS

Research exchange
Bath University, Department of Psychology
Bath, England
Contact: Professor Bas Verplanken

During my research exchange, I will plan and coordinate the environmental field study, but my main objective is to get feedback on my second paper and to delve into the field of habits, learning theory and behavioural change with the help of Professor Bas Verplanken.

Seminars/conferences
The abstract of the first paper is accepted for an oral presentation at the IAREP 2011 conference in Exeter (July 12-15). Being one of the coordinators of the public dissemination of the results obtained in the Step by step change of children’s preferences towards healthier foods research project, I will give a talk on the results to be used in my second article on August 23, 2011.

The reality of research
During my first year of PhD studies, the reality of research has slowly revealed itself to me in the form that financial reality is not necessarily equal to research reality. I planned the environmental study, agreed on cooperation with and co-financing from Syd Energi and applied for a grant at ELFORSK in September 2010. Unfortunately the application was rejected. Together with my supervisors, I applied for a grant from The Danish Agency for Science, Technology and Innovation (Det Frie Forskningsråd) in March 2011. Grants are made public in the autumn 2011. Therefore, this thesis proposal has described my plan A. If the application is rejected, my plan B is to base all four papers on the health study. I will briefly describe my plan B hoping that it will not become necessary to activate it:

Paper 1: As described above

Paper 2: A paper comparing the self-efficacy levels and behaviour of parents and children in terms of fruit and vegetable consumption and physical activity levels

Paper 3: As described above

Paper 4: A review paper on SMS-based feedback targeting young people's health behaviour, illustrated by one case study.
References


Appendix 1: Counting form for health study

TÆLLESKEMA TIL PROJEKT STEP-BY-STEP

**FRUGT**
1 ENHED
- 1 apelsin
- 1 banan
- 1 æble
- 1 grøntsag
- 1 mango
- 1 banan/kirsken
- 1 kiwi
- 1 grape
- 1 stort lejemæl
- 1 gensindføring
- 1 glass juice
- 1 glass juice

**GRØNT**
1 ENHED
- 1 gulrot
- 1 tomats
- 1 rodegrønt
- 1 mais
- 1 spise

1 ENHED = 1 HÅNDFULD
- 1 dl.
- 100 g
- babygur
- rodegrønt
- grønne grønt
- grønne bønner
- røde bønner

**FYSISK AKTIVITET**
1 ENHED = 1 MINUT
- gå i cykel
- gå i fodbolt
- fysisk leg
- gå i løb
- gå i skridt
- gå i skridt
- gå i skridt
- gå i skridt

MAPP

tregion midtjylland
Appendix 2: Illustration of the principle of SMS-reporting and feedback

Prompt for SMS-report

SMS-report

Feedback comparing report to self-set goal